Volume 93 Number 1

STEEL

For forty-eight Years—IRON TRADE REVIEW

PRODUCTION • PROCESSING • DISTRIBUTION • USE

The Week in Perspective

THAT characteristic of American industrial life—the convention— also is marching in the procession of recovery. With the American Foundrymen's association completing its sessions, the American Society for Testing Materials and the American Society of Mechanical Engineers moved upon Chicago. Coupled with Engineers' day at the Century of Progress exposition, probably more technical men passed a given point at Chicago June 28 than ever before in American history.

It's Engineers' Week at Chicago

Many aspects of gray cast iron, including production, properties and uses, were discussed by the three groups, a joint symposium of the A.S.T.M. and A.F.A. assembling (p. 36) a record collection of data. Another session dealt with specifications and standards. . . .An A.S.M.E.-A.F.A. session was devoted (p. 40) to the use of cast iron in machine construction. . . .Many A.F.A. meetings bore exclusively (p. 29) on gray iron foundry problems.

Dust Is Foundry Enemy No. 1

Incidentally, good housekeeping has spread to the foundries. A lively A.F.A. session finally indicted dust as the major problem, it being agreed (p. 28) however that a thorough housecleaning should precede any dust elimination program. Recommended as the next step is elimination of dust at the source, with provision for helmets and respirators for workers if complete elimination proves impossible.

Industry Now On Steel and Iron Standard

An important discussion of the A.S.T.M. concerned (p. 38) the establishment of standards for steel and wrought iron. . . .A summary of results obtained in a 3-year study of the application of roller bearings to roll necks of mills was presented (p. 41) to the A.S.M.E. iron and steel division, comparative operating costs of various types of bearings being considered. . . Concurrently, two expositions were being held in Chicago (p. 41), one featuring apparatus used in testing materials and the other equipment and appliances employed in the power and manufacturing industries.

Prices of Light Products Rise, Heavy Hold

General Johnson's recovery administration, seeking to restrain commodity price advances until wages have spiraled upward, can now fully appreciate the task of the fabled Dutch boy who attempted to plug the hole in the dike with his finger. Heavy finished steel prices apparently are being held in check, being extended through the third quarter (p. 49), but hot and cold-rolled sheets and strip, railroad spikes and ferromanganese are sensitive to an

Four large and four small guns are no terror for this 350-ton hammerhead crane built by Dravo Contracting Co., Pittsburgh, for Puget Sound navy yard. Overall height is 175 feet, length of the rotating structure 316 feet

inherently strong market. . . . The Johnson administration, incidentally, comes under review of the President on his return from Campobello island (p. 13), for one thing to determine whether it is autonomous or under the cabinet committee. . . . The steel industry trade code postponed, wage advances are coming out in its advance (p. 12). Labor, meanwhile, is attempting to organize the industry.

28 Stacks Lighted in June; Steel Rate Up to 54

Evidencing the vigor of the markets, 28 blast furnace stacks were lighted in June (p. 17), an 11-year record. . . . Steel ingot operations, rising 3 points (p. 17), have pushed up to 54 per cent, with another point or two expected this week. . . . Canada participates in this improvement (p. 16), doubling its steel output. . . . Noteworthy as the betterment is, it is superimposed on the lean year 1932, shown by the American Iron and Steel institute report (pp. 20, 21) to have a total of only 13,681,162 gross tons of steel ingots and castings, lowest since the turn of the century. . . . The showing is comparable to that of Ford Motor Co. (p. 16), whose 1932 loss exceeds $79,000,000.

Finish Can Be No Better Than the Roll

For the unusually high finish of stainless steel strip, a mirror-like surface is required of the cold mill rolls, in turn leading mill engineers to develop special abrasive practice (p. 25). In obtaining the proper surface, one which is geometrically accurate, much depends upon the speeds and feed; plenty of time and moderate cuts, is the prescription. The life of a roll before regrinding is about 8 hours in the finishing stand, 18 hours in the second stand, and 1½ days in the roughing stand. Regrinding requires 3 or more hours. . . .An Ohio stripmaker has found that dust and grit collect in canvas used to protect the polished surface of rolls, imprinting the pattern of the canvas on the roll; a spiral of heavy paper is better (p. 46).

In The Week's Engineering News

Several 150-barrel storage tanks of stainless-clad steel have been installed (p. 27) in a Chicago brewery; a new beer barrel with a stainless interior with air space between this and the carbon steel shell is nearing introduction. . . . Gas-engine driven compressors at a western by-product coke plant automatically compensate (p. 34) for variations between 20 and 70-pound pressures in pumping gas into the mains of a public utility. . . .Improvements in design and operation of existing open-hearth furnaces should be undertaken (p. 31) only as part of a comprehensive schedule of betterment developed to overcome all weaknesses of a unit.

The VOICE of INDUSTRY

Communications appearing here do not necessarily reflect the opinion of STEEL *or of its editors.*

Sidelights on N. I. R. A.

No Wild-Cat Price Lifting

"This is a deadly serious matter—this danger of runaway prices. There are still about 12,000,000 unemployed in this country and even those who still have jobs are largely on much reduced incomes. Any wildcat price lifting will have its first bearing directly on the very necessities of these unfortunates. . . . This administration will not stand for that and we do not expect to have any trouble about it. Our best people understand that this is no time to get rich quick."

—GEN. HUGH S. JOHNSON, Director,
National Recovery Administration

New Vehicles, New and Untried Drivers

"There never has been a time when one needed to be more alert than the present. There never has been a time in the American business street when there were so many new and strange vehicles passing and, to add to the hazard, with so many new and untried drivers attempting to guide these new devices . . .

"The national industrial recovery act is one of the newest and most radical of our new devices for fighting the depression. It is one of the new and strange vehicles on our business street that is not understood.

"The bill will prove to be good or bad according to how it is administrated. There are several conflicting groups whose efforts to get an advantage is quite manifest as one studies the act. If the administrator of this law can prevent any such efforts from becoming successful, he will have done a wonderful service."

—DR. S. M. KINTNER,
Vice President in charge of engineering,
Westinghouse Electric & Mfg. Co.

Unlimited Power for Good or Ill

"In signing the industrial control—public works bill on June 16, President Roosevelt stated: 'History probably will record the national industrial recovery act as the most important and far-reaching legislation ever enacted by the American congress.'

"Is is all of that and more. It is the most revolutionary and far-reaching piece of legislation ever injected into our American philosophy of life and of government.

"It contains almost unlimited power for good or ill, depending entirely how its provisions are interpreted and administered, and on the support it receives from those it is intended to benefit."

—GEORGE M. VERITY, Chairman,
American Rolling Mill Co.

Wrong Path to Stabilization

"The difficulty, so far as prices are concerned at the present time, is to be found in price interrelationships, not in the general price level. There is no way by which we can manipulate prices to any given level and stabilize them there. The methods by which we are undertaking to do so will not, on the basis of actual experience whether of recent years or of the post-civil war period, either produce desirable readjustments or provide necessary stabilization."

—DR. H. PARKER WILLIS
Bulletin, National Association of Purchasing Agents

A Century of Progress — In Iron and Steel Industry

A CENTURY OF PROGRESS, Chicago's spectacular exposition, depicts not only the growth from Fort Dearborn to the second largest city of the nation but also the marvelous advances in the arts and sciences in the past hundred years.

Iron—and to a lesser extent steel, because it is younger—also has had its century of progress. In production it increased from a mere 35 pounds per capita in 1833 to the record of 1040 pounds in 1929.

In technique, the industry has progressed from hand methods to the continuous processes, with quality constantly improved and cost tending lower in ratio to volume and mechanization.

In its June 5 issue STEEL presented a description of the exposition at Chicago, with special emphasis upon the features pertaining to iron and steel. But the advances of the industry itself can best be grasped by a simple, chronological recital of outstanding events:

1833—Pig iron production, 165,000 tons.

1834—First practical application of hot blast to the manufacture of pig iron in this country, at Oxford furnace in New Jersey.

1835—First successful use of coke in the blast furnace in the United States accomplished by William Firmstone at Mary Ann stack, Huntingdon county, Pennsylvania.

Belt-Driven Wire Rod Mill

1839—First successful blast furnace use of anthracite coal in the United States at Pioneer furnace, Pottsville, Pa. First important improvement in American wire rod mill design incorporated in unit at Fall River, Mass. Mill was belt driven and had various size pulleys to change the speeds.

1840—Pig iron production 286,903 tons; 804 blast furnaces. First wire rope manufactured in this country by John A. Roebling in Butler county, Pennsylvania. The first bridge in America made of cast iron throughout built over the Erie canal at Frankfort, N. Y. Henry Burden, Troy, N. Y., invented rotary squeezer for working puddled iron free from slag.

1841—Manufacture of Connellsville coke started in western Pennsylvania. Lap welding process of making tubes on a mandrel using grooved rolls developed.

1842—First blast furnace in the United States to draw hot furnace gas for use by burning under steam boilers was the Greenwood, Orange county, New York.

1844—Iron ore discovered in the Lake Superior district. Manufacture of heavy iron rails in this country started at Mt. Savage Rolling Mill, Allegheny county, Maryland.

1846—William Talley discovered pneumatic process of making malleable iron from pig iron.

1850—Pig iron production, 563,755 tons; steel, 6078 tons.

1851—First wire nail machine built in America; operated almost continuously for 52 years.

1852—First 3-high beam mill in America built by Trenton Iron Co.

1854—First wrought iron beams rolled in the United States for fireproof buildings. Blast furnace erected at Port Henry, N. Y., said to have been the first furnace ever made encased completely in an iron shell. It was 46 feet high.

1855—First 30-foot rails rolled in this country at Cambria Ironworks, Johnstown, Pa.

1857—John Fritz invented 3-high rolling mill and installed unit at Cambria Iron Co., Johnstown, Pa.

1860—Pig iron production, 821,223 tons; steel, 11,838 tons. Continuous annealing, cleaning and galvanizing introduced in this country at Worcester, Mass.

1865—First bessemer steel rails rolled in America at North Chicago Rolling Mill, Chicago.

1867—First steel rails ever rolled commercially in United States by Cambria Iron Co., Johnstown, Pa.

1869—First continuous wire rod mill in America erected in Worcester, Mass.

1870—Pig iron production, 1,665,179 tons, steel 68,750 tons. Openhearth furnace started at the Bay State Works, South Boston, Mass., the first works of this kind regularly in operation in this country.

1876—First use of soft bessemer steel for tin plate in this country at the works of the United States Iron & Tin Plate Co., Demmler, Pa.

Continuous Heating Furnace

1880—Pig iron production, 2,741,853 tons; steel, 1,247,335 tons. Continuous heating furnace markedly developed, W. D. Allen introducing wrought iron pipe, water-cooled skids, and Mr. Morgan introducing the suspended roof and skewbacks supported by water-cooled pipe.

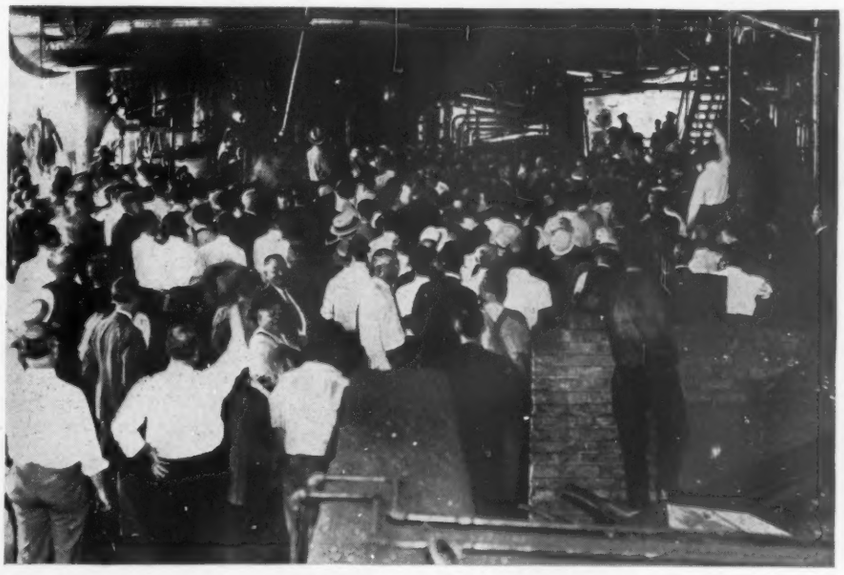
1883—First steel cut nails ever made were manufactured by Riverside Iron Works, Wheeling, W. Va.

1884—First driven cable rolls for finishing rail mills were installed at Troy, N. Y.

1886—First experiments in the United States with a basic hearth, conducted at works of Otis Steel Co.

1887—First butt and lap welded pipe made of steel in this country.

1888—Manufacture of basic steel



HAPPY DAYS ARE HERE AGAIN FOR BRADDOCK: When the "I" furnace of the Edgar Thomson works, Carnegie Steel Co., Pittsburgh, was blown in June 27, cheers of hundreds of spectators joined with the roar of the initial blast. A parade of over 500 automobiles was held afterward, celebrating the lighting of the furnace. The procession was headed by automobiles bearing I. Lamont Hughes, president, Carnegie Steel Co., Frank Slick, superintendent of the Edgar Thomson works, and civic officials of nearby towns. Almost 3000 workmen are now being employed at the works. This is the third blast furnace at Edgar Thomson works to be blown in during the past month. Previously there had been no stack operating there since October, 1931

in this country started as a commercial product at Homestead, Pa.

1889—First tilting open-hearth furnace erected at Steelton, Pa.

1890—Pig iron production, 9,202,703 tons; steel, 4,277,071. First armor plate made in America produced at Bethlehem, Pa.

1892—Steel ore ships appear on Great Lakes.

1895—Introduction of Vaughen mud gun for stopping blast furnace iron notches.

1900—Pig iron production, 13,789,242 tons; steel, 10,188,329 tons. United States for the first time made more open-hearth steel than Great Britain.

1901—United States Steel Corp. organized.

1902—First gas engine power plant operated in this country with blast furnace gas.

1906—Use of oxygen adopted to open frozen or hard iron notches at blast furnaces.

1915—Heating furnaces in the iron and steel industry developed for pulverized fuel firing.

Cokemaking Processes Refined

1918—World's largest by-product coke plant placed in operation at Clairton, Pa. Satisfactory blast furnace coke made from Illinois coals.

1920—Pig iron production, 36,925,987; steel, 42,132,934 tons.

1922—Three-apart system of rolling black plate made possible by development of mechanical doubling machine. Development of mechanical tin pot feeder permitted coating of commercial sizes of black plate at rate of 100 to 150 base boxes in eight hours.

1923—First cluster type mill for rolling sheets up to 60 inches wide and strip steel in practicaliy any width, installed in this country.

1925—First large stack in this country to be blown with 16 tuyeres, at Indiana Harbor, Ind.

1926—First automatic pilger mill in United States for manufacturing seamless tubes erected at Auburn, Pa. Wide strip rolled for the first time in this country at Butler, Pa.

1927—Sheets rolled continuously to No. 16 gage direct from an ingot without reheating, at Middletown, O, Direct metal from blast furnaces used successfully for first time for pouring automobile cylinder castings at Detroit.

1928—Tin plate of No. 48 gage manufactured commercially. Invention of rotary-type clay gun made possible construction and operation of stacks capable of producing 1000 tons or more iron in 24 hours.

1929—Pig iron production, 42,613,983 tons; steel, 56,433,473 tons.

1930—Wrought iron produced by the Aston process and with mechanical equipment made for first time on a commercial scale at Ambridge, Pa. Manganese-silicon alloy developed for deoxidizing open-hearth heats. Blast furnace with 28½-foot hearth and 1500 tons daily output, claimed to be largest in world, completed at Aliquippa, Pa. Fifty-four-inch blooming mill with rolls driven direct by separate motors installed in Chicago district. Automatic screwdown control equipment developed for reversing blooming mills and plate mills. Continuous pair and pack heating systems with mechanical feeders and catchers find wide application.

1931—Slow blowing for fanning of blast furnaces inaugurated in this country. Electric regenerative drag installed on sheet mill in Detroit. Application of electron tubes in steel industry grows. First push bench mill for producing seamless pipe installed at Aliquippa.

1932—Pig iron production, 8,674,067 tons; steel, 13,047,568 tons. Single stand of four high rolls served on either side by a holding furnace for maintaining uniform temperature during reduction, developed for converting slabs to strip.

1933—Diameter and wall thickness of seamless tubing reduced simultaneously by new mill at Beaver Falls, Pa. Roller leveling machine, which renders sheets free from stretcher strains, developed. Development of nondendritic steel and rotary casting process of producing it. Forged steel plate housings of laminated construction used on 84-inch cold sheet mill at Gary, Ind.

Steel Wages Rise As Code Is Near

WHILE the general meeting of steel executives, called by the American Iron and Steel institute to consider a trade code for the industry under the national industrial recovery act, will not be held until late this week, sporadic wage advances are appearing.

Andrews Steel Co., Newport, Ky., and Continental Steel Corp., Kokomo, Ind., advanced wages of employes 10 per cent, effective July 1. Allegheny Steel Co. put up wages 5 per cent also, effective July 1. Salaried employes in many steel offices are now receiving an increase in compensation by virtue of a return to longer working schedules. The trade code, expected to be adopted late this week, doubtless will lay down a general policy for the industry.

Headquarters of the American Federation of Labor, to organize the steel industry under the opening granted by the recovery act, have been set up in many steel centers. In Pittsburgh a paid advertisement of the Amalgamated Association of Iron, Steel and Tin Workers has invited iron and steel labor to contact it. Hand bills distributed in Cleveland call upon steel labor to get in touch with the metal trades department of the American Federation of Labor. Employe representation plans are denounced as "the bosses' union."

Despite recent discussions, leaders in the iron and steel industry reaffirm the earlier opinion that tonnage allocation will not be adopted in the code which will go to Washington, probably within a week.

The most intense activity in recent years characterizes the New York headquarters of the American Iron and Steel institute, an effort being made to formulate a code that will serve as a base for the entire industry and to which the codes of various consuming and fabricating interests can be attached.

Myron C. Taylor, chairman of the United States Steel Corp., returned Friday from a 6-week trip to Europe, and his judgment will be available on the new code.

Other Codes Shaping Up

Concrete Reinforcing Steel institute, Chicago, having had the benefit of sponsoring a federal trade practice conference, is working upon its code, which will be co-ordinated with the institute program.

The American Manganese Producers association this week is sending a copy of its code to all members who will be called to meet in Washington during the week of July 10 to take final action.

The Pressed Metal institute, Buffalo, had a meeting June 24, appointed committees to work on trade codes. C. C. Carlton, of the Motor Wheel Corp., is chairman of the organization and contacts committee; R. F. White, of the Mullins Mfg. Corp., is chairman of the fair trade code committee; J. Kramer, Hart & Cooley Mfg. Co., is chairman of the labor committee; and E. H. Wildt, Motor Wheel Corp., is chairman of the cost system committee.

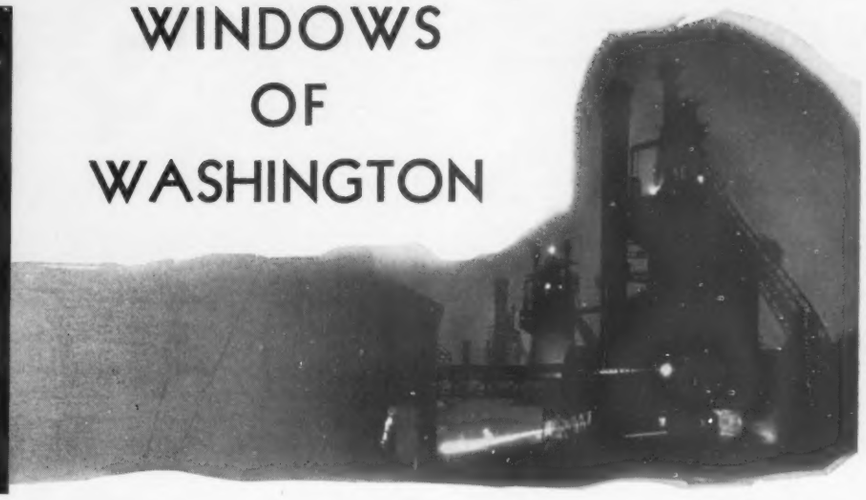
A code committee, of which Phil W. Frieder, Youngstown, O., is chairman, has been appointed by the Institute of Scrap Iron and Steel Inc. to draft its code to be submitted at the Chicago convention of the institute this week.

National Institute of Engine and Machine Builders, which met in New York June 23, may be the spokesman for the metal trades division of the iron and steel industry in the matter of a code.

Follansbee Now at 80%

Follansbee Bros. Co. Inc.,reports operations at its plants now at approximately 80 per cent. The company is now employing more than 1000 men, the heaviest schedules being 100 per cent tin plate production. Open hearths at Toronto, O., are operating but the sheet mills there have not yet been started.

WINDOWS OF WASHINGTON



WASHINGTON

FROM his vacation on Campobello island, which would have been more of a success had there not been almost daily a discussion of the London economic conference, President Roosevelt returns shortly to face an array of complicated problems which would dishearten one less buoyant.

Some of the issues which will be brought in at the end of a poker will cool rapidly when dissected, in the Rooseveltian manner, in the air-conditioned White House offices, but a number of forthright decisions of policy will be urgent.

For example, the London conference, how far can the United States go toward stabilization of world currencies without stifling the rise in domestic commodity prices, application of the new and greatly reduced federal budget which became effective July 1, and a prompt distribution of public works while satisfying party demands for patronage.

For industry, the troublesome issues revolve chiefly around the administration of the national industrial recovery act and the personality of Gen. Hugh S. Johnson, administrator of its industrial section.

Is General Johnson autonomous or is he subordinate to the cabinet committee headed by Secretary of Commerce Roper, as the latter has intimated?

Can General Johnson carry his liberal views on collective bargaining against the determination of labor counsellors on his staff to supply impetus to unionization?

Faithful to the Roosevelt tradition, the linen will not be washed publicly. A quiet, subdued word will suffice.

Chances are that the cabinet will be mollified with a superficial, broad control over the Johnson organization, and that General Johnson will continue to operate the show, as he terms it.

The President will do nothing to block the organization efforts of the American Federation of Labor, but if industry in a quiet way can preserve the status quo, make a showing of representation of labor, and bring in satisfactory minimum wage rates and maximum work weeks, the Johnson policy will prevail.

It needs to be remembered that General Johnson is a Baruch man, and his patron is closer to the President than any other business man.

The labor situation is a little more vexing because Secretary Perkins probably is closer to the President than any other cabinet member, but General Johnson is the type that the President admires immensely—snappy, quick, decisive, full of action—and he is a better advocate than Secretary Perkins.

For all his apparent impetuosity, General Johnson knows his politics. He has denied vigorously the report that at one time last week he planned to move his entire organization out of Secretary Roper's building. Publicly he speaks of cabinet co-operation being all that could be desired.

And Secretary Roper gives no surface confirmation of the suspicion that it is annoying to see Secretary of the Interior Ickes seated so firmly on the lid of the public works administration, which is housed in his building, while the Roper tenant—General Johnson—is so independent.

Roosevelt Becomes Referee

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Industry Is Losing "Face"

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Bureau Will Complete Tests

ITS hearing on the textile industry trade code has been for the Johnson recovery administration the equivalent of a shakedown cruise for a new ship.

It has developed procedure and precedents, disclosed a militant organized labor group, sharpened the bargaining proclivities of General Johnson—and provided the country with a spectacle.

The reaction is somewhat indefinable, but it does not appear quite consistent with the pre-eminent position of industry in this country to come to Washington and virtually plead its case before a panel of deputy administrators and counsellors.

Before a crowd of 800—apparently largely adherents of labor—in the department of commerce building auditorium, the textile industry dragged the skeletons out of its closet, was subjected to some harrassment by organized labor, confessed a lack of unity and had its decisions contested by a strong minority.

The procedure, laid down for industry by Donald Richberg, attorney for railroad labor, is not judicial or legislative but strictly administrative—to use the official language. There is an air of informality, and no disposition to be other than impartial. There is cross-examination by the deputy administrator, but not by opposing factions within industry.

Each industry is expected to present a different problem, but if there is any cue for iron and steel in the textile hearing it is the advantage of presenting a united front. The broken ranks of the textile industry afforded an opportunity for the recovery administration to press its own ideas of wage rates and hours. A definite, well-conceived and generally-accepted program is not only what the adminstration prefers, but it deprives labor of a foothold for its objections. Almost any compromise would appear preferable to a divided front.

General Johnson has stated that conditions of industry vary so widely that no blanket application is possible, but in general it appears that an hourly wage of 45 cents and a work week of 32 hours represent his present idea of minimum subsistence pay.

A new element in the hearings is the consumers' advisory board, named by Secretary Perkins and comprising Mrs. C. C. Rumsey, so-

cial worker of New York and daughter of the late railroad magnate, E. H. Harriman; Prof. Frank Graham, president of the University of North Carolina; Prof. William Ogburn, of the University of Chicago; Mrs. J. J. Daniels, of Indianapolis, president of the Indiana League of Women Voters; and Miss Belle Sherwin, Cleveland, president of the National League of Women Voters.

NEXT after textiles to submit a trade code will be iron and steel, with oil, coal and automobiles completing the lineup of the five "key" industries General Johnson hopes to cover speedily.

The iron and steel code is expected late this week or early next, with a hearing possibly beginning sometime next week.

There is a feeling that, difficult as it will be to embrace the widespread iron and steel industry in one code, automobiles will prove harder.

For one thing, organized labor appears more determined to try to unionize Detroit than it does Pittsburgh or Chicago. Even though they are a scant month old, employe representation plans will be put forth by iron and steel producers; automotive executives have no plans under way.

Henry Ford, it is understood, had a representative at the recent sessions of automotive manufacturers at Detroit, at which a code was considered—which is a new degree of co-operation.

The recovery administration has not regarded the matter as one requiring emphasis as yet, but it is understood that regardless of any continued improvement in general business, the recovery act will be enforced.

There is increasing reference to this deduction: That the art of salesmanship will be revived as a result of the recovery act. Even if price fixing is not openly tolerated, the tendency will be to level off prices, and instead of "selling" concessions manufacturers are expected to compete more on a basis of quality and service.

Whether the public works section will go through with its entire program will await events. A rousing recovery extending into next year might easily result in a halt, but the machinery is being built up on the basis of spending a billion dollars a year and employing a million men.

Rules for applying for loans from the "federal emergency administration of public works" have been issued, and the administration has taken over from the Reconstrnuction Finance Corp. its authority for making self-liquidating loans.

MOST studies at the bureau of standards eventually include a compression test, but the staff is now engaged in its most important experiment on expansion—that of determining the elastic limit of its budget for the year which began July 1.

Like other government agencies, the bureau's budget was pruned in conformity with the general program of economy. The extent of retrenchment, however, will not be determined until the amount of testing required in connection with the public works program is acertained.

Few major investigations will be cut off sharply, inasmuch as a majority are in the stage where only a little additional work will complete them, but new projects will be scanned carefully and few will survive.

The work being done in co-operation with the American Society for Testing Materials on springs and spring materials probably will be completed by fall; this involves a very complete study of all materials.

Tests of the defective heat-treated wire removed from the Mt. Hope bridge in Rhode Island and the Ambassador bridge at Detroit will be continued, it being important to determine promptly the merits of high-test wire.

The bureau hopes to continue its investigation of pure iron as well as its monograph on pure iron. Its study of gases in metals also will be carried on.

Work on high-temperature properties of metals will be seriously curtailed, although tests that have been under way several months will be concluded. Other projects to be curtailed include single crystal specimen work, and fatigue and combined corrosion and fatigue effect on metals.

In the foundry, projects under way will be rounded up, including the improvement of cast iron by superheating, and aluminum alloys.

While the national screw thread commission has been officially abandoned, the program will be continued informally and the third revision of the report of the commission will be issued this fall. This commission, incidentally, was an outgrowth of the World war and the Wilson administration.

The fact that Dr. Lyman J. Briggs, chief of the bureau, was appointed by President Roosevelt and confirmed by congress after his appointment earlier in the year by former President Hoover had fallen afoul of the Democratic embargo on all Hoover nominees appears to be assurance that politics and science will remain divorced.

GERARD SWOPE, General Electric Co., was chosen permanent chairman of the executive committee of Secretary Roper's business advisory and planning council for the department of commerce. . . . J. F. Dewhurst, chief economist for the American Iron and Steel institute, has been conferring with Arthur D. Whiteside, deputy administrator of the recovery administration. . . . Commodity divisions of the bureau of foreign and domestic commerce may receive a reprieve through the effort of Assistant Secretary of Commerce Dickinson to use the facilities of divisions for the recovery administration. Union Drawn Steel Co., Beaver Falls, Pa., has been granted a drawback on cold-drawn steel manufactured with the use of wire rods and steel bars made under drawback regulations.

Porcelain Group For Recovery Code

PORCELAIN ENAMEL INSTITUTE, national trade association or the enameling industry, took action at its third annual meeting, held in Chicago, June 28, to comply with the provisions of the national industrial recovery act.

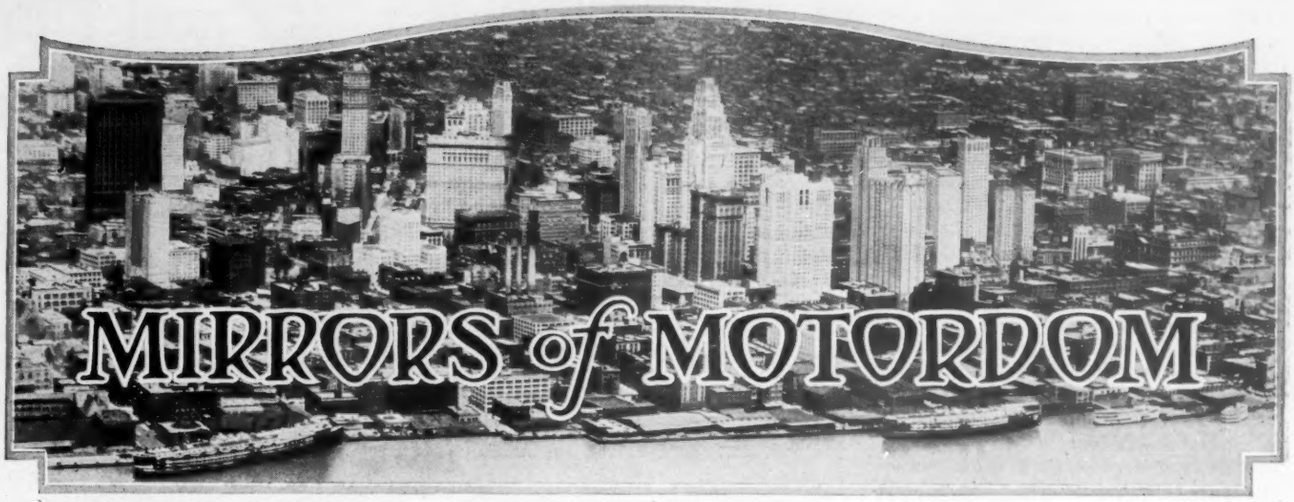
A resolution was adopted calling for sponsorship by the institute of a national recovery co-ordinating committee for the porcelain enamel, metal stamping and allied industries. This committee will meet to determine what steps shall be taken by all users of porcelain enamel with reference to stipulations of the recovery act.

More than 100 leaders of the enameling industry from all sections of the country were present. Rudolf W. Staud, Benjamin Electric Mfg. Co., Chicago, was re-elected president of the institute. Other officers chosen include: Vice presidents, Earle S. Smith, Toledo Porcelain Enamel Products Co., Toledo, O., and F. E. Hodek Jr., General Porcelain Enameling & Mfg. Co., Chicago; treasurer, William Hogenson, Chicago Vitreous Enamel Product Co., Chicago, who was re-elected for a third term. George P. MacKnight was re-elected secretary.

Members of the institute's executive committee include the officers and the following: Bennett Chapple, American Rolling Mill Co.; Louis Ingram, Ingram-Richardson Mfg. Co.; E. H. Weil, Vitreous Steel Products Co.; George S. Blome, Baltimore Enamel & Novelty Co.; R. A. Weaver, Ferro Enamel Corp.; W. R. Greer, Porcelain Enamel & Mfg. Co.; and A. J. Kieckhefer, National Enameling & Stamping Co.

Steel Rates are Reduced

Rates on minimum shipments of iron and steel articles from New Bedford and Fairhaven, Mass., to points west of Chicago have been reduced.



June May Be Summer Peak

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Stir Up Banking Situation

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Ford Loss in 1932 a Record

DETROIT

TURNING into July, automobile production hangs in delicate balance. Probably the month's total will not vary greatly from June, but the season and general economic conditions are introducing variables which require careful and constant study.

Production schedules, it should be understood, usually are pessimistic at the beginning of a month and represent the minimum expectations of sales departments. Schedules are more easily expanded than contracted; since April the tendency has been entirely on the up side.

Chevrolet, whose June output exceeded the most optimistic forecast by approximating 80,000 units, opens July with a tentative schedule about equal to May, or 65,000 units. This is not to imply that Chevrolet sales are waning; rather that early-month conservatism is becoming intensified as the summer progresses and there are more seasonal factors to combat.

For other General Motors lines, June rates are carrying over, which means about 12,000 units for Pontiac, 5000 to 5500 each for Buick and Olds and 1000 for Cadillac-LaSalle. General Motors in June assembled about 103,000 automobiles; the present indication for July is about 90,000.

Chrysler last month swept into second place by making good the estimate of almost 60,000 units. Plymouth, which topped its May record of 34,554 units by at least 3000, is now assembling 1700 a day, six days a week, representing capacity, or 40,000 units monthly. Other Chrysler lines also enter July on an unchanged basis, Dodge at better than 10,000 and DeSoto and Chrysler combined over 5000.

Despite a weakened dealer setup and an almost total lack of factory support, Ford operated six days last week and was more often above 2500 a day than below. Ford assemblies in June probably were 45,000 to 50,000; July opens on a 60,000 basis.

Some Ford parts makers have been instructed to prepare for an 80,000 car month in July. But a factor in appraising Ford activity is the approach of the annual vacation period. Ford will go down in August, probably about the tenth, for at least two weeks and possibly for the remainder of the month, and hence July production may begin to anticipate this shutdown.

Thus for the "big three" adjustments in schedules at the start of July are practically a standoff. Factors which require careful watching and appraising are:

July and August normally are soft production months, but this year automobile buying dates from April 1 instead of Jan. 1.

Retail demand in the East, which largely supported April, May and June output, is declining, and at an accelerated rate. The West, on the other hand, tends to improve but is not quite offsetting the easier situation in the East.

The notable strength in farm products prices, many automotive executives believe, will not be fully reflected in automobile buying before fall. But the chance that it will create some midsummer demand is good.

The full benefits of re-employment also are regarded as a major fall factor but may break through at any time.

Accordingly, the best opinion today in Detroit is that July production may be a little on the under side of June, with August definitely softer, but with every indication of a strong September and October.

June production, incidentally, was 218,171 units in the United States, the best since July, 1931, and comparing with 180,667 in April, 117,949 in March, 106,825 in February and 130,044 in January.

THIS estimate of July refers only to assemblies. Production of parts is another—and probably higher—matter.

The movement of steel into Detroit in June exceeded May by a wide margin. For most interests, June shipments were the heaviest since early 1931. One steel manufacturer even surpassed any month of 1929.

With many automotive departments operating 24 hours a day and some seven days a week, the press for steel has not been equalled since 1929. Within the past two weeks there have been occasional complete stoppages of departments for want of material.

Chrysler is building up "banks" of materials and parts to carry it at least 30 days. Other manufacturers have not balked at over-shipments, but in June most steel moving into the Detroit area was for immediate consumption.

Since material shipped in June is for fabrication in July, a marked increase in July production of parts is indicated. This does not square with the probable parity of June and July assemblies.

The explanation may be that some portion of July production of parts will be anticipatory, both on account of rising prices and a possible contest with the American Federation of Labor on the question of unionization, not only of the automotive industry but also its principal suppliers.

A complete shutdown of the automotive industry would not be too great a price to pay, it is felt, to maintain the open shop status of Detroit. With a few exceptions of the

type which caused the strikes of February and are resented by the remainder of the industry, automotive labor is generously paid.

In one unit of General Motors, for example, the minimum hourly rate is 40 cents, paid to a few sweepers. On most assembly lines the range is 55 to 75 cents an hour. Headquarters of the American Federation of Labor have been opened in Detroit, and a fight is on.

One sign of the times is the apparent disposition of many large automotive consumers to place a greater proportion of their requirements with the larger supply interests, there being more of a feeling of security both in regard to prices and to shipments in case of a stoppage. Detroit still remembers what happened to steel prices when controlled prices were terminated following the World war.

For all practical purposes, no third quarter contracts for steel have been placed, the exception being alloy steel, usually sold farther ahead than carbon steel. Specific releases at second quarter prices for shipment at mill's convenience are being accepted.

DETROIT is steaming again over its banking situation, disclosures at the grand jury investigation into the closing of Michigan banks Feb. 14 tending to confirm the widespread suspicion that the city received a raw deal.

The feeling is strong that, although the position of the two leading Detroit banks was precarious, they might have been salvaged, and that Washington elected to help topple them over into the lap of "Wall Street."

This feeling is manifest in another effort to obtain a government loan and reorganize the two closed banks. The co-operation of Detroit with the new bank opened with the treasury and General Motors equal partners has left something to be desired, largely reflecting sentiment against a New York wedge in local banking.

But seasoned judgment is against the inference that "Wall Street" wrecked the Detroit banks, in turn upsetting the entire banking system of the country, in order to strangle the $65,000,000 Henry Ford had on deposit in Detroit and force him to go to New York for a loan.

Whatever effort was made to pinch Mr. Ford was a by-product and not a major objective, it is believed. In addition to his Detroit accounts, Mr. Ford had almost $250,000,000 in cash, some of course caught in the banking jam in other cities.

If certain banking interests, as charged, sought a hold on the Ford Motor Co. they were blinded by the item of $303,650,429 of cash as of last Dec. 31. The record shows that the Ford company has been running behind for six years, and that it has not made any money since Model T was dropped.

In 1932, according to the Ford report to the Massachusetts commissioner of corporations and taxation, the decline in the company's profit and loss account was $74,861,644, or almost $1,500,000 a week. In addition, reserves were depleted $4,386,025, indicating a total 1932 loss of $79,247,699.

This report, which supersedes the one of a few weeks ago to New Hampshire authorities, confirms earlier estimates and reveals 1932 as the most disastrous year in Ford history. A comparison of balance sheets shows:

Assets—	Dec. 31, 1932	Dec. 31, 1931
Real estate	$157,686,317.72	$158,387,688.12
Machinery and equipment	108,668,123.48	124,601,735.47
Merchandise	58,344,341.03	64,884,690.90
Cash	303,650,429.64	372,283,104.62
Prepaid insurance and taxes	5,909,690.50	1,972,496.58
Total	$634,257,902.37	$722,329,715.69
Liabilities—		
Capital stock	$ 17,264,500.00	$ 17,264,500.00
Accounts payable	30,000,154.42	38,824,297.92
Reserves	6,552,645.41	10,938,670.67
Surplus	580,440,602.54	655,302,247.10
Total	$634,257,902	$722,329,715.69

It may or may not be coincidence, but the sun set on Ford profits when Model T came to the end of its run in 1927. From its first report in 1909 through 1926, Ford profited in each year. But from 1927 to 1932 inclusive, the net deficit stands at $121,583,240. This is the preponderance of deficits in 1927, 1928, 1931 and 1932 over the profits of 1929 and 1930.

The Ford showing is difficult to gage because dividends are not reported and profits and losses must be deduced from fluctations in the profit and loss account. With this reservation in mind, and with 1932 revised, the following brings up to date the financial history of the Ford company first printed in STEEL for Feb. 6, 1933, p. 16:

Year	Profits
1909	$ 3,125,876
1910	4,127,208
1911	7,288,303
1912	13,552,239
1913	27,001,203
1914	24,923,449
1915*	23,426,662
1916	57,056,429
1917	23,715,944
1918	30,341,057
1919**	70,000,000
1920†	61,907,449
1921†	17,198,564
1922††	57,601,040
1923 (a)	119,298,862
1923*	82,263,483
1924	115,105,416
1925	115,078,383
1926	75,270,895
(Model T is dropped)	
1927 (deficit)	42,786,727
1928 (deficit)	72,221,498
1929	81,797,861
1930	44,460,823
1931 (deficit)	53,586,000
1932 (deficit)	79,247,699

*10 months. **Year ended July 31. †10 months ended April 30. ††10 months ended Feb. 28. (a) Year ended Feb. 28.

There are some who believe that the reason Ford is not pushing the present eight is that the volume to produce it at a profit is not yet in sight, hence only a moderate increase in sales would only intensify the loss.

Detroit is not unmindful, either, that the trend at Fordson is to convert inventories into cash. In the past few weeks Ford has sold semi-finished steel, pig iron and coke, the latter two to manufacturers of Ford parts.

Recently, the accumulation of scrap at Fordson was sold to the Bethlehem Steel Co., perhaps an indication that the 10 Ford open hearths will not soon be operated.

WORLD production of automobiles in 1932 was 1,979,251 units of which the United States supplied 1,370,687, the United Kingdom 244,434, France 170,995 and Canada 60,816. . . .Solution of the problem of headlight glare may come from the outside; speeds up to 50 miles an hour without the use of headlights are claimed possible on highways lighted with a new sodium-vapor electric lamp introduced recently at the New York Electric society. . . . In northern Montana crude oil is being bought for $1 a barrel, heated, the vapor passed through a radiator and condensed into "moonshine" gasoline. . . . .Motor Wheel Corp.'s output of 1,137,000 centrifuse brake drums Jan. 1-May 31 almost equaled the 1,250,000 made in all 1932. . . Murray has increased its beer barrel production to 3500 a day, requiring 800 tons of sheets weekly. . . . Gabriel Co., Cleveland, has booked a contract to supply trunks for all Chrysler lines. . . . Olds and Pontiac already have produced more cars than in all 1932; Chevrolet will do so about the second week of July. . . . Most automobile plants in Detroit were closed July 3, giving employes a 2-day holiday.

Canada Doubles Steel Total

Steel ingot and castings output in Canada in May at 23,126 gross tons was more than double the 11,384 tons produced in April. It was the best month since January, when 40,766 tons were made. The five-month total of ingots and castings in Canada is 98,862 tons, compared with 162,370 tons in 1932.

No pig iron was produced in Canada in May. Output of ferroalloys was 1005 tons, compared with 918 tons in April.

June Iron Daily Rate Up 46 Per Cent; 28 Stacks Resume

PRODUCTION of coke pig iron in the United States in June was approximately 42,050 tons per day, an increase of 13,266 tons, or 46.1 per cent, over the 28,784-ton average daily rate of May. This was the highest level recorded in almost two years, or since July, 1931, with 47,170 tons. It is also the first time since 1922 that June output has exceeded that of May.

During June, 28 blast furnaces resumed operations, raising the active total of 61 on May 31 to 89 on June 30, a figure which was the largest since June, 1931, with a total of 91. Only five times since monthly pig iron figures were first compiled in 1907 has the net gain in furnaces exceeded 28. The last time was in October, 1922, when the increase was 29.

No furnaces were blown out or banked in June. Of the 28 resuming, 26 were nonmerchant or steelworks stacks, and only 2 were merchant.

The indicated rate in June was compiled from estimates of production supplied by 30 companies. Total production for the month amounted to approximately 1,261,600 gross tons, a gain of 369,274 tons, or 41.4 per cent, over the 892,326 tons of May. June was a one-day shorter month than May, but, in spite of this, production exceeded a million tons for the first time since November, 1931.

Relating production to capacity, operations in June were at a rate of 30.5 per cent, against 21.2 per cent in May, 15.1 per cent in April and 12.7 per cent in March. Since March, production has increased 140 per cent.

Complete tabulations of production will be presented in the July 9 issue of STEEL.

Steel Rate Gains 3 Points to 54%

DUE principally to expansion in the Pittsburgh, Chicago and eastern Pennsylvania districts, the steelworks rate advanced 3 points to 54 per cent in the week ended July 1. Heavier schedules this week, at least at Buffalo and Birmingham, will probably put the steel rate above 55 per cent. Details for the districts follow:

Chicago

Blast furnace and open-hearth operations increased further the past week under the stimulus of rising demand. The leading interest lighted two more blast furnaces, giving the district 13 active steelworks stacks out of 36 with one merchant furnace also blowing. Open hearth schedules advanced 3 points to 53 per cent, the best rate in more than two years. This rate is expected at least to be maintained this week.

Pittsburgh

Steel production in the Pittsburgh district was 46 per cent at the end of last week, a gain of 4 points. Eleven open-hearth furnaces were added to the active list during the week and 95 of 201 open hearths were active in six leading plants as of June 30. This compares with 84 on June 23. One mill placed five more furnaces in, a second producer four, and the third one. Another steelworks blast furnace was blown in in the Edgar Thomson works early in the week; Bethlehem Steel Co. at Cambria works, Johnstown, Pa., blew in No. 6 furnace June 27, making four of seven active there. In the immediate Pittsburgh district, Carnegie Steel Co. is operating 11 of 32 blast furnaces, National Tube Co. one of four, Jones & Laughlin Steel Corp. five of 11, and Pittsburgh Crucible Steel Co. one of two. Pittsburgh Steel Co. was preparing to blow in one of its Monessen, Pa., furnaces July 1. For this week, steel operations in the Pittsburgh district probably will hold the 46 per cent rate. According to plans late last week, no further improvements were immediately in sight.

Cleveland

Including Lorain, steelworks operations have risen 3 points to 82 per cent, 32 out of 39 steelworks open hearths being active. Corrigan, McKinney Steel Co. is operating 13 out of 14, Otis Steel Co. 7 out of 8 and the Lorain works all 12. Bessemer capacity at Lorain is 100 per cent engaged. Otis Steel Co. will add two of its five small open hearths at its Lakeside plant this week. Seven out of 11 blast furnaces are active and two more will be added shortly.

Wheeling, W. Va.

At 86 per cent, steel ingot production in the Wheeling, W. Va., district fulfilled the 2-point gain predicted ten days ago. For this week the rate will be unchanged at 86 per cent. There are 27 of 33 open hearths active.

Eastern Pennsylvania

Steelmaking operations in the central eastern seaboard district have increased 6 points, to 39-40 per cent. While the July 4 holiday may retard operations momentarily, it is not expected to be of as much influence as in other recent years due to the pressure to get tonnage off the books during July. Steelmaking operations this month are believed likely to exceed June in view of the heavy releases

Operating Rate of the Steel Industry, by Weeks

All figures except the monthly open-hearth and bessemer ingot totals of American Iron and Steel institute are percentages. Estimates are based upon reports from Pittsburgh, Chicago, Youngstown, eastern Pennsylvania, Cleveland, Birmingham, Buffalo, Wheeling, Worcester and Detroit districts, which are weighted. Weeks end Saturday.

1932	1st Week	2nd Week	3rd Week	4th Week	5th Week	Steel's Average	Institute's Monthly Total tons	Institute's Monthly Average
Jan.....	22	25	26	27	28.5	25.7	1,484,991	26.41
Feb.....	28.5	27	25	25	....	26.4	1,481,253	27.40
March....	25	25.5	24.5	23	....	24.5	1,433,337	24.55
April.....	23	22	22	23	24	22.8	1,259,629	22.40
May.....	24	24	25.5	23	....	24.1	1,125,243	20.01
June.....	21	17	17	17	....	18.0	912,757	16.23
July.....	14.5	12	15.5	16.5	16.5	15.0	806,722	14.92
Aug.....	14.5	14.5	15.5	14.5	....	14.7	846,730	14.50
Sept.....	13.5	15.5	15	17	....	15.3	991,858	17.64
Oct.....	18	19	19.5	19.5	19.5	19.1	1,087,058	19.33
Nov.....	21	21	19	17.5	....	19.6	1,032,221	18.36
Dec.....	16	15	14	12	13	14.0	861,034	15.31
1933								
Jan.....	15.5	17	18	19	....	17.4	1,030,075	18.23
Feb.....	19	19	19	17	....	18.5	1,086,867	20.83
March....	15	13.5	15	14	15.5	14.6	909,886	15.50
April.....	17.5	20.5	25	29	....	23.0	1,362,856	25.08
May.....	33	36	40	43	....	38.0	2,001,991	34.11
June.....	47	48	49	51	54	....	.....	....

that characterized the close of last quarter, and a desire to speed output before higher wages become effective.

Buffalo

Steel operations here last week were at 48 per cent, but this week will gain 6 points to 54 per cent, representing 19 open hearths on. Bethlehem is adding two, making 16 active. Wickwire Spencer may light another open hearth shortly.

Birmingham

Eleven out of 16 open hearths in this district, eight at Fairfield and three at Gadsden are operating, the rate for the district on a capacity basis being slightly over 50 per cent. Five open hearths at the Ensley Works of the Tennessee company are being lighted in preparation for resumption of the rail mill at Ensley July 10. This week, therefore, steel operations may go to 75 per cent.

New England

The steel rate last week was at 71 per cent and despite the holiday will go this week to 83 per cent. One plant will operate at 93 per cent, a sharp advance, while others hold.

Canada

Dominion Steel & Coal Corp., Sydney, N. S., expects to operate at 50 to 60 per cent of capacity the remainder of the year.

Sights Shortage of Steel Scrap Within Ten Years

A shortage of scrap steel within the next ten years was predicted by Benjamin Schwartz, director general, Institute of Scrap Iron and Steel, speaking before the open hearth committee of the American Institute of Mining and Metallurgical Engineers holding its spring meeting in Chicago, June 29.

Mr. Schwartz attributed the situation chiefly to the increasing use of alloys in steel, which prolongs its life and retards its normal rate of return to scrap piles. Contributing factors are technological progress of the steel industry, which has increased the percentage of scrap used; export of large tonnages of scrap; and reciprocal deals between steel companies, railroads and other scrap producers.

Estimating that available ore reserves will last 60 years at normal operations and that the scrap backlog is represented by approximately 750,000,000 tons of steel in use, Mr. Schwartz stated that the steel industry must either dig into its ore reserves to a greater extent or encourage collection of cheaper grades of scrap and develop uses and markets for them.

L. F. Reinartz, works manager, American Rolling Mill Co., Middletown, O., chairman of the open hearth committee, was authorized to appoint a committee to co-operate with the Scrap institute in a study of this problem.

Died:

COLEMAN WARD, 55, president, Hickman, Williams & Co., Pittsburgh, pig iron, coke, scrap and ferroalloys, at his home in Pittsburgh, June 26. Long prominent in the field which his company served, Mr. Ward's death followed an illness dating from last November. He was born in Louisville, Ky., the son of Thomas Coleman Ward, and with his father was identified early in life with the Birmingham Rolling Mills Co., Birmingham, Ala. He was also at one time identified with the Sloss-Sheffield Steel & Iron Co. blast furnaces, also at Birmingham, Ala., but in 1903 went to Pittsburgh, identified himself with Hickman, Williams & Co., and for the past 25 years had been continuously affiliated with the company of which he was president at the time of his death. Aside from his prominence socially in Pittsburgh, he was a member of the American Iron and Steel institute and other organizations.

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Charles Malischke, 60, president, Charles Malischke Co., Milwaukee, manufacturing tools, dies, jigs, etc., June 21.

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John A. Worth, retired engineer at Sharon, Pa., division of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., at Sharon, Pa., June 24.

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Elijah W. Hodge, 89, founder of the Hodge Mfg. Co., Greenville, Pa., June 4. Going to Greenville in 1868 he became associated with the Hamblin & Son Co. foundry eight years later founding his own company.

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Roland Erwin Wiens, 36, sales engineer, electrical department, Allis-Chalmers Mfg. Co., Milwaukee, at Cambridge, Mass., June 24, at his former home in Milwaukee. He was graduated from the United States Naval academy in 1917, later serving three years as an ensign.

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David J. Post, 72, chairman and director of Billings & Spencer Co. and director of Veeder-Root Inc., Trout-Brook Co., and Holo-Krome Screw Co., all of Hartford, Conn., June 25. Entering business with the Weed Sewing Machine Co. in 1881, he became known as one of the leading Connecticut industrialists. He retired in 1928.

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Robert Leslie Kift, 49, treasurer, Lehigh Structural Steel Co., Allentown, Pa., at Bethlehem, Pa., June 25. He had been connected with various construction companies and at one time was general manager of the Bethlehem Construction Co. He was among those chiefly instrumental in formation of the Lehigh company shortly after the World war.

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Frank N. MacLeod, 67, president and owner, Abrasive Machine Tool Co., East Providence, R. I., at his summer home, Harwichport, Mass., June 25. For many years he was with the Brown & Sharpe Mfg. Co., Providence, most of the time as assistant sales-manager. He was a former vice president of the National Machine Tool Builders' association and a member of the Providence chamber of commerce.

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Sebern Allen Cooney, 72, Glenbrook, Conn., formerly engineer with John A. Roebling's Sons Co., Trenton, N. J., June 26. For 20 years he was with the Roebling organization as bridge engineer and designer. He also designed and erected many tramways. He had obtained 19 patents during his career, and tramway and conveying machinery designed by him took a gold medal at the St. Louis exposition and first prize at the Seattle-Yukon exposition.

□ □ □

James R. McWane, 64, president, McWane Cast Iron Pipe Co., Birmingham, Ala., in Chicago, June 24. Leaving the ministry of the Disciples of Christ church in 1894, he organized the McWane Plow Works. Two years later he went to Lynchburg, Va., to become vice president of the Lynchburg Plow Co. He went to Birmingham in 1903 as president of the American Steel Casting Co., four years later became president of the American Cast Iron Pipe Co. and in 1922 organized his own company.

Carnegie Recalling Barges As River Traffic Expands

Carnegie Steel Co., Pittsburgh, is recalling its Ohio river barges wherever possible. Movement of steel products down the Ohio river from its Pittsburgh plants and the anticipation that the movement will be heavier soon has necessitated the recall. The company is estimated to have some 300 steel barges.

Carnegie Steel Co. owns and has operated 12 tow boats but a few months ago chartered many of those in condition for service. Others are tied up at the Clairton, Pa., works. Owing to the light volume of Ohio river steel traffic at that time, private barge lines were used, but now traffic appears headed for a heavier status and barges are being recalled.

During one day of last week, 68 empty barges passed through the Pittsburgh harbor on the way to Monongahela river landings. These had all been recalled from down-river points.

Industrial Men in the Day's News

Prof T. R. Lawson, President, American Society for Testing Materials

AFFILIATED 35 years with Rennselaer Polytechnic Institute, and head of its civil engineering department.

ASSOCIATED more than 25 years with the Society for Testing Materials; engaging in important research work, including steel.

A SCIENTIST who, for relaxation, goes to the mountains and plants vegetable gardens.

MORE than a quarter century's devotion to affairs of the American Society for Testing Materials was rewarded June 26 when the society at its annual meeting in Chicago elected Prof. T. R. Lawson president for the coming year.

Professor Lawson has been head of the department of civil engineering, Rennselaer Polytechnic institute, Troy, N. Y., since 1921. He was graduated from Rennselaer in 1898 with the degree of civil engineer; has been affiliated with the institute continuously—the center of his life's work. He was successively instructor and assistant, associate professor, and since 1908 has been professor of rational and technical mechanics.

His interest in the Society for Testing Materials has run a parallel course. He has been chairman for the last three years of the society's important committee on standards. He is a member of its committee on brick, on slate, methods of testing. From 1928 to 1930 he was a member of the society's executive committee.

Professor Lawson has taken a leading part in many of the extensive research investigations conducted by the Rennselaer Polytechnic testing laboratory, especially tests on welded structural members which were made when the feasibility of welding steel structures was being investigated. As a member of the research committee on yield point of structural steel, he has personally directed an extensive series of tests.

He also takes a great deal of interest in several other societies with which he is associated, including the American Welding society, American Society of Civil Engineers, American Concrete institute, and Clay Products institute, of which he is president.

He has rendered consulting service on many structural and hydraulic projects.

A summer home in the mountains just east of Troy engages his attention when he is not instructing his classes or testing materials, and there he goes to test the fertility of the soil with vegetable gardens—gardening being his principal recreation. He takes pride—and exercise—in planting and tending the crops. Also, he and Mrs. Lawson derive a great deal of enjoyment from motoring trips, and this summer plan to tour the West.

GEORGE C. ISBESTER has become associated with the Yale & Towne Mfg. Co., Philadelphia division, to direct the sale of Yale hand and electric trucks and tractors to railroads in the Middle West, with headquarters at 713 Railway Exchange building, Chicago. Mr. Isbester has been identified with the railroad field since 1899, when he joined the mechanical department of the Great Northern railroad. In 1917 he became a captain in the navy and served at the Great Lakes Naval Training Station, Great Lakes, Ill., and on the staff of Admiral Simms in foreign waters.

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W. J. Harris, since April, 1920, in charge of the purchase section of the American Car & Foundry Co., Berwick, Pa., now is also a vice president of the company. In 1889, he entered the service of the Jackson & Woodin Mfg. Co., one of the companies from which the American Car & Foundry Co. was formed in 1899.

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H. R. Orwick, formerly general manager of Corundite Refractories Inc., Massillon, O., has become special refractory engineer for the Massillon Refractories Co., Massillon. Mr. Orwick was with the Corundite company 16 years.

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T. F. Thornton, for the past six years in charge of tubular product sales of the Pittsburgh Steel Co. in the Detroit district, has become sales manager in Detroit for the Babcock & Wilcox Tube Co., Beaver Falls, Pa. He has headquarters in the Ford building, Detroit.

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Jessel S. Whyte, secretary and treasurer of the MacWhyte Co., Kenosha, Wis., wire rope and cable, has been reappointed by the governor of Wisconsin as a member of the state board of vocational education for a 6-year term expiring July 1, 1939.

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Dr. John B. Whitehead, dean of the faculty of engineering, Johns Hopkins university, Baltimore, has been

(*Please turn to Page* 63)

1932 Steel Ingot and Casting Output

American Iron and Steel Institute Official Figures Show Decline of 52 Per Cent from 1931 for Steel Ingots and Castings—Only 25 Per Cent of Record Year 1929

PRINCE-and-pauper destiny of steel, epitomized by Andrew Carnegie, has had no better illustration than the record high tonnage produced in 1929 and the almost record low tonnage in 1932. In three years, production, according to figures by the American Iron and Steel institute, plunged from the all-time top of 56,433,473 gross tons of ingots and castings in 1929 to 13,681,162 gross tons in 1932, the lowest in more than 30 years. In rolled iron and steel products the slide was from 41,069,416 gross tons to 10,451,088 gross tons, for the same years.

It is necessary to go back to 1901 to find a lower production of steel ingots and castings, the total that year being 13,473,595 gross tons, and to 1900 for a lower total production of rolled iron and steel, that year yielding 9,487,443 gross tons.

Not only was total production of 1932 far below that of the peak year, 1929, being approximately 25 per cent of the output of that year, but it was also sharply lower than in 1931, which had seemed far below that of 1929 and 1930. Rolled steel production in 1932 was 54.5 per cent of that in 1931 and ingots and castings 52 per cent.

In reaching this nadir of the movement the decline accelerated as it progressed. From 1929 to 1930 the loss was 27.8 per cent; from 1930 to 1931 it was 36.2 per cent and from 1931 to 1932 it was 47.7 per cent.

Total production of steel ingots and castings in 1932 was 13,681,162 gross tons, of which 13,464,402 gross tons were ingots and 216,760 gross tons were castings. As in previous years steel castings lost volume more rapidly than ingots.

Included in the 11,742,682 gross tons of basic open-hearth steel ingots and castings produced in 1932 are 289,263 tons of duplex ingots and castings which were made from metal partly purified in bessemer converters and finally purified in basic open-hearth steel furnaces, against 945,844 tons in 1931, a decrease of 69.42 per cent.

In 1932, 126 works in 24 states and the District of Columbia made steel ingots, against 132 works in 24 states and the District of Columbia in 1931. In 1932, 257 works in 33 states, the district of Columbia, Alaska and the Canal Zone, Panama, made steel castings, against 291 works in 35 states, the District of Columbia, Alaska and the Canal Zone, Panama, in 1931.

Of the total production in 1932, about 99.06 per cent was rolled from steel, as compared with about 99.02 per cent in 1931. In 1932, about 31.28 per cent of the total production was rolled in Pennsylvania, against 33.08 per cent in 1931, and about 22.12 per cent in Ohio, against 21.31 per cent in 1931. In 1932, there were 256 plants in 27 states which rolled finished forms of iron or steel, against 282 plants in 27 states in 1931.

Included in the 10,451,088 tons of finished rolled products produced in 1932 are 196,286 gross tons rolled from old rails, including 9488 tons of rails, 41,879 tons of light structural shapes, 24,265 tons of merchant bars, 110,490 tons of concrete bars, 2582 tons of steel strip, 1268 tons of long angle splice bars and tie plate bars, 1453 tons of steel cross ties and 4861 tons of miscellaneous rolled products.

In the accompanying table presenting total production of finished rolled iron and steel it is explained that blooms, billets and axle blanks rolled for forging purposes are included from 1905, while semifinished products rolled for export are included for 1912 and subsequent years.

PRODUCTION OF STEEL INGOTS AND CASTINGS BY PROCESSES, GROSS TONS

Years	Open-hearth			Bessemer	Crucible	Electric	Miscellaneous	Total
	Basic	Acid	Total					
1918	32,476,571	1,982,820	34,459,391	9,376,226	115,112	511,364	329	44,462,472
1919	25,719,312	1,229,352	26,948,694	7,271,562	63,572	384,452	2,952	34,671,232
1920	31,375,723	1,296,172	32,671,895	8,893,087	72,265	502,152	3,535	42,132,934
1921	15,082,564	507,238	15,589,802	4,015,938	7,613	169,479	945	19,783,797
1922	28,387,171	921,812	29,308,983	5,919,295	28,606	346,039	....	35,602,926
1923	34,665,021	1,234,636	35,899,657	8,484,088	44,079	515,872	....	44,943,696
1924	30,719,523	857,827	31,577,350	5,809,590	22,473	432,536	....	37,931,939
1925	37,087,342	947,146	38,034,488	6,723,962	19,562	615,512	....	45,393,524
1926	39,653,315	1,038,664	40,691,979	6,934,566	15,493	651,723	....	48,293,763
1927	37,144,268	924,067	38,068,335	6,191,727	9,038	666,087	....	44,935,185
1928	43,200,483	913,473	44,113,956	6,620,195	7,769	802,260	....	51,544,180
1929	47,232,419	1,120,469	48,352,888	7,122,509	6,643	951,431	....	56,433,473
1930	34,268,316	780,856	35,049,172	5,035,459	2,253	612,599	....	40,699,483
1931	22,130,396	379,168	22,509,566	3,023,446	1,547	410,942	....	25,945,501
1932	11,742,682	164,648	11,907,330	1,532,076	645	241,111	....	13,681,162

PRODUCTION OF STEEL CASTINGS

1918	505,880	634,950	1,140,830	160,844	1,330	108,296	110	1,411,410
1919	313,965	448,555	762,520	98,819	1,009	111,510	2,579	976,437
1920	449,330	537,070	986,400	104,980	1,729	155,196	3,237	1,251,542
1921	217,957	216,488	434,445	38,809	736	85,095	628	559,713
1922	425,981	404,767	830,748	47,733	1,045	154,982	....	1,034,508
1923	571,310	581,299	1,152,609	67,512	1,952	235,958	....	1,458,031
1924	456,518	402,901	859,419	53,437	1,377	209,549	....	1,120,782
1925	455,282	462,303	917,585	53,834	1,833	279,534	....	1,252,786
1926	480,627	505,379	986,006	43,066	2,041	326,445	....	1,357,558
1927	393,881	430,414	824,295	38,021	1,340	294,809	....	1,158,468
1928	381,926	458,590	840,516	28,450	1,253	348,568	....	1,218,787
1929	588,213	544,076	1,132,289	30,829	883	419,039	....	1,583,040
1930	369,798	413,675	783,473	14,871	690	305,181	....	1,104,215
1931	143,465	184,780	328,245	12,052	716	175,566	....	516,579
1932	53,187	59,854	113,041	3,532	404	99,783	....	216,760

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS, GROSS TONS

Years	Ingots	Castings	Total	Years	Ingots	Castings	Total
1919	1,435,816	45,372	1,481,188	1926	2,317,313	146,101	2,463,414
1920	1,591,939	68,353	1,660,292	1927	2,385,904	145,844	2,531,748
1921	769,293	40,255	809,548	1928	3,045,225	169,684	3,214,909
1922	1,614,392	59,104	1,673,496	1929	3,764,287	192,920	3,957,207
1923	2,014,269	92,220	2,106,489	1930	2,317,183	126,128	2,443,311
1924	1,940,461	85,948	2,026,409	1931	1,366,010	89,903	1,455,913
1925	2,320,390	112,583	2,432,973	1932	757,560	41,044	798,604

Similar statistics are not available prior to 1909.

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS BY PROCESSES, 1931-1932, GROSS TONS

Processes	1932			1931 Total
	Ingots	Castings	Total	
Open-hearth steel—basic	613,356	3,363	616,719	1,131,491
Open-hearth steel—acid	14,713	12,523	27,236	57,864
Bessemer steel	12,642	1,009	13,651	34,044
Crucible steel	84	37	121	401
Electric steel	116,765	24,112	146,877	232,113
Total	757,560	41,044	798,604	1,455,913

In 1932, there were 199 works in 30 States, the District of Columbia and Alaska which made alloy steel ingots or castings.

TOTAL PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL, 1892-1932, GROSS TONS

Years	Iron and steel rails	Plates and sheets	Wire rods	Structural shapes	Nail plate	All other finished rolled	Total
1892	1,351,844	751,460	627,829	453,957	201,242	2,579,482	6,165,814
1893	1,136,458	674,345	537,272	387,397	136,113	2,104,190	4,975,685
1894	1,021,772	682,900	673,402	360,305	108,262	1,793,570	4,642,211
1895	1,306,135	991,439	791,130	517,920	95,085	2,487,845	6,189,574
1896	1,122,010	965,776	623,986	495,571	72,137	2,236,361	5,515,841
1897	1,647,892	1,207,286	970,736	583,790	94,054	2,497,970	7,001,728
1898	1,981,241	1,448,301	1,071,683	702,197	70,188	3,239,760	8,513,370
1899	2,272,700	1,903,505	1,036,398	850,376	85,015	4,146,425	10,294,419
1900	2,385,682	1,794,528	846,291	815,161	70,245	3,575,536	9,487,443
1901	2,874,639	2,254,425	1,365,934	1,013,150	68,850	4,772,329	12,349,327
1902	2,947,933	2,665,409	1,574,293	1,300,326	72,936	5,383,219	13,944,116
1903	2,992,477	2,599,665	1,503,455	1,095,813	64,102	4,952,185	13,207,697
1904	2,284,711	2,421,398	1,099,028	949,146	61,601	4,597,497	12,013,381
1905	3,375,929	3,532,230	1,808,688	1,660,519	64,542	6,398,107	16,840,015
1906	3,977,887	4,182,156	1,871,614	2,118,772	54,211	7,383,828	19,588,468
1907	3,633,654	4,248,832	2,017,583	1,940,352	52,027	7,972,374	19,864,822
1908	1,921,015	2,649,693	1,816,949	1,083,181	45,747	4,311,608	11,828,193
1909	3,023,845	4,234,346	2,335,683	2,275,562	63,746	7,711,506	19,644,690
1910	3,630,031	4,955,484	2,241,830	2,266,880	45,294	8,475,756	21,621,279
1911	2,922,790	4,488,049	2,450,453	1,912,367	48,522	7,316,990	19,039,171
1912	3,327,917	5,873,080	2,653,553	2,846,487	45,331	9,908,475	24,656,841
1913	3,502,786	5,751,037	2,464,807	3,004,972	37,503	10,030,144	24,791,243
1914	1,945,095	4,719,246	2,431,714	2,031,124	38,573	7,204,444	18,370,196
1915	2,204,203	6,077,694	3,095,907	2,437,003	31,929	10,546,188	24,392,924
1916	2,854,518	7,463,980	3,518,746	3,029,864	30,088	15,493,093	32,380,389
1917	2,944,161	8,267,616	3,137,138	3,110,000	22,864	15,585,921	33,067,700
1918	2,540,892	8,799,135	2,562,390	2,849,969	18,310	14,385,058	31,155,754
1919	2,203,843	7,372,814	2,538,476	2,614,036	12,832	10,359,343	25,101,544
1920	2,604,110	9,337,680	3,136,907	3,306,748	20,577	13,941,835	32,347,863
1921	2,178,818	4,260,574	1,564,330	1,272,924	14,573	5,483,087	14,774,006
1922	2,171,776	7,968,397	2,654,741	2,718,768	21,969	10,916,353	26,452,004
1923	2,904,516	9,497,717	3,075,892	3,405,197	22,833	14,370,921	33,277,076
1924	2,433,332	8,087,885	2,522,545	3,283,708	22,175	11,736,792	28,086,435
1925	2,785,257	9,807,659	2,844,656	3,004,130	22,038	14,424,220	33,386,960
1926	3,217,646	10,529,056	2,722,032	3,911,963	17,337	15,098,155	35,495,892
1927	2,806,486	9,627,734	2,770,271	3,742,445	18,651	13,914,041	32,879,631
1928	2,647,493	11,006,050	3,080,810	4,096,143	16,200	16,816,214	37,662,916
1929	2,722,138	12,436,312	3,134,409	4,778,020	9,827	17,988,710	41,069,416
1930	1,873,253	9,057,306	2,348,600	3,312,473	*	12,711,335	29,513,007
1931	1,137,751	6,039,581	1,844,620	2,092,858	*	8,071,084	19,175,894
1932	402,569	3,443,309	1,186,181	937,228	*	4,481,805	10,451,088

*Included in "all other finished rolled."

Prior to 1887 complete statistics of the production of all forms of finished rolled iron and steel are not available.

at Lowest Point of Twentieth Century

PRODUCTION OF CAST-IRON PIPE AND FITTINGS, 1931–1932, NET TONS

Kinds of pipe	1931			1932		
	Pipe	Fittings	Total	Pipe	Fittings	Total
Gas and water*	910,242	35,094	945,336	393,560	16,420	409,980
Soil and plumbers	140,916	43,040	183,956	90,423	27,185	117,608
Total	1,051,158	78,134	1,129,292	483,983	43,605	527,588

* Includes culvert pipe.

PRODUCTION OF MERCHANT BARS, SHOWING IRON AND STEEL MERCHANT BARS SEPARATELY, 1913–1932, GROSS TONS

Years	Iron	Steel	Total	Years	Iron	Steel	Total
1913	1,026,632	2,930,977	3,957,609	1923	404,730	5,148,066	5,552,796
1914	563,171	1,960,460	2,523,631	1924	258,737	4,022,184	4,280,921
1915	657,107	3,474,135	4,131,242	1925	290,488	5,368,827	5,659,315
1916	993,948	5,236,354	6,230,302	1926	252,437	5,221,399	5,473,836
1917	983,926	5,226,031	6,209,957	1927	187,995	4,682,252	4,870,247
1918	846,898	5,395,851	6,242,749	1928	165,277	6,112,558	6,277,835
1919	446,549	3,945,075	4,391,624	1929	154,690	*6,305,206	*6,459,896
1920	663,032	5,467,208	6,130,240	1930	95,234	*4,036,739	*4,131,973
1921	198,324	1,367,430	1,565,754	1931	52,943	*2,387,420	*2,440,363
1922	317,665	3,660,993	3,978,658	1932	29,057	1,284,839	1,313,896

* Revised.

PRODUCTION OF CONCRETE BARS, SHOWING IRON AND STEEL CONCRETE BARS SEPARATELY, 1917–1932, GROSS TONS

Years	Iron	Steel	Total	Years	Iron	Steel	Total
1917	1,497	469,687	471,184	1925	1,195	818,392	819,587
1918	468	344,152	344,620	1926	1,649	814,180	815,829
1919	2,295	416,726	419,021	1927	2,428	813,585	816,013
1920	698	571,747	572,445	1928	462	951,426	951,888
1921	1,094	226,134	227,228	1929	557	*963,043	*963,600
1922	696	575,120	575,816	1930	160	849,991	850,151
1923	368	680,499	680,867	1931	104	643,529	643,633
1924	507	655,615	656,122	1932	169	385,436	385,605

* Revised.

PRODUCTION OF HEAVY AND LIGHT STRUCTURAL SHAPES, 1921–1932, GROSS TONS

Years	Heavy shapes	Light shapes	Total	Years	Heavy shapes	Light shapes	Total
1921	1,082,727	189,897	1,272,624	1927	3,083,211	659,234	3,742,445
1922	2,337,026	381,742	2,718,768	1928	3,408,545	687,598	4,096,143
1923	2,917,446	487,751	3,405,197	1929	4,055,615	722,405	4,778,020
1924	2,805,084	478,624	3,283,708	1930	3,010,847	501,626	3,512,473
1925	3,049,817	554,313	3,604,130	1931	1,768,374	294,484	2,062,858
1926	3,330,572	581,091	3,911,663	1932	782,570	154,658	937,228

PRODUCTION OF TINPLATES AND TERNE PLATES, 1918–1932, POUNDS

Years	Tinplates	Terne plates	Total
1918	3,216,247,675	85,376,569	3,301,624,244
1919	2,407,156,757	171,859,924	2,579,016,681
1920	3,079,953,351	158,067,437	3,238,020,788
1921	1,675,320,852	103,853,961	1,779,174,813
1922	2,707,648,715	177,235,512	2,884,884,227
1923	3,168,263,546	*207,106,248	3,375,369,794
1924	2,975,231,674	*202,553,793	3,177,785,467
1925	3,458,574,585	*254,885,172	3,713,459,757
1926	3,750,481,879	*241,883,727	3,992,365,606
1927	3,546,778,888	*235,347,756	3,782,126,644
1928	3,841,576,534	*278,241,691	4,119,818,225
1929	4,068,338,817	*340,608,132	4,408,946,949
1930	3,719,128,284	*230,983,261	3,950,111,545
1931	3,118,589,245	*149,444,185	3,268,033,430
1932	2,209,125,646	*103,689,879	2,312,815,525

* Includes 79,314,626 pounds of long terne plates in 1932, 114,543,486 pounds in 1931, 184,873,512 pounds in 1930, 253,601,576 pounds in 1929, 203,027,669 pounds in 1928, 152,371,645 pounds in 1927, 152,457,892 pounds in 1926, 163,820,675 pounds in 1925, 107,986,974 pounds in 1924, and 106,764,720 pounds in 1923.

PRODUCTION OF CUT NAILS IN 100-LB. KEGS, 1921–1932

Years	Production	Exports	Consumption	Years	Production	Exports	Consumption
1921	538,834	24,512	514,322	1927	702,836	25,715	677,121
1922	810,206	78,602	731,604	1928	619,784	29,042	590,742
1923	829,604	51,515	778,089	1929	533,833	20,124	513,709
1924	741,668	47,537	694,131	1930	459,923	10,589	449,334
1925	736,111	36,265	699,846	1931	317,275	3,072	314,203
1926	662,403	23,979	638,424	1932	285,801	3,539	282,262

PRODUCTION OF IRON AND STEEL GALVANIZED SHEETS AND GALVANIZED FORMED PRODUCTS, 1922–1932, POUNDS

Years	Galvanized sheets	Galvanized formed products*	Total
1922	2,109,991,396	165,713,067	2,275,704,463
1923	2,364,862,856	165,741,098	2,530,603,954
1924	2,228,960,835	155,901,514	2,384,862,349
1925	2,539,112,552	178,219,576	2,717,332,128
1926	2,788,473,075	154,572,764	2,943,045,839
1927	2,767,615,399	168,500,859	2,936,116,258
1928	3,040,763,695	172,453,640	3,213,217,335
1929	3,083,975,953	177,727,692	3,261,703,645
1930	2,341,361,607	146,094,351	2,487,455,958
1931	1,707,015,552	112,459,141	1,819,474,692
1932	1,150,888,790	86,934,933	1,237,823,723

* Articles formed or stamped from iron or steel black plates or black sheets and galvanized after the completion of the forming or stamping process.

PRODUCTION OF PLATES AND SHEETS BY KINDS, 1917–1932, GROSS TONS

Years	Universal plates*	Sheared plates	Total universal and sheared plates	Black sheets rolled on sheet or jobbing mills	Black plates rolled on tin mills.		Total black sheets and black plates
					Black plates for tinning	Other black plate specialties	
1917	1,195,199	2,963,039	4,158,238	2,367,752	1,505,338	236,288	4,109,378
1918	1,234,782	3,885,126	5,119,908	2,073,639	1,489,586	116,002	3,679,227
1919	992,054	2,899,267	3,891,321	2,099,840	1,144,601	237,052	3,481,493
1920	1,249,769	3,505,364	4,755,133	2,886,401	1,449,330	246,816	4,582,547
1921	570,610	1,189,714	1,760,324	1,511,817	786,962	201,471	2,500,250
1922	1,248,413	2,171,507	3,419,920	2,917,236	1,266,652	364,589	4,548,477
1923	1,304,227	2,864,518	4,168,745	3,503,071	1,498,830	327,071	5,328,972
1924	1,001,694	2,147,171	3,148,865	3,266,430	1,415,182	257,406	4,939,018
1925	1,196,021	2,557,430	3,753,451	4,096,832	1,632,236	325,140	6,054,208
1926	1,407,547	2,793,635	4,201,182	4,237,479	1,761,944	328,451	6,327,874
1927	1,244,549	2,476,261	3,720,810	3,979,037	1,657,215	270,672	5,906,924
1928	1,304,356	2,609,272	3,913,628	4,962,410	1,791,021	338,991	7,092,422
1929	1,425,300	3,596,841	5,022,141	5,254,998	†1,778,742	†380,431	7,414,171
1930	1,040,715	2,622,108	3,662,823	3,511,557	1,691,938	201,048	5,404,543
1931	614,837	1,351,375	1,966,212	†2,461,494	1,431,293	†180,582	4,073,369
1932	309,653	520,177	829,830	1,471,532	999,528	142,418	2,613,478

* Include flats and bars over 6 inches wide.

PRODUCTION OF SKELP SHOWING IRON AND STEEL SKELP SEPARATELY, 1917–1932, GROSS TONS

Years	Iron	Steel	Total	Years	Iron	Steel	Total
1917	336,591	2,337,640	2,674,231	1925	178,586	3,051,182	3,229,768
1918	258,500	2,305,511	2,564,011	1926	189,774	3,574,776	3,764,550
1919	192,146	2,363,632	2,555,778	1927	156,204	3,262,648	3,418,852
1920	252,403	2,967,886	3,220,289	1928	140,318	3,228,655	3,368,973
1921	115,523	1,815,052	1,930,575	1929	151,556	3,365,682	3,517,238
1922	218,868	2,653,347	2,872,215	1930	114,426	2,567,620	2,682,046
1923	216,846	3,517,490	3,734,336	1931	70,777	1,428,503	1,499,280
1924	165,581	3,004,962	3,170,543	1932	31,991	575,608	607,599

PRODUCTION OF SEAMLESS, LAP WELD, BUTT WELD, AND ELECTRIC WELDED PIPE AND TUBES IN 1932, GROSS TONS

SEAMLESS PIPE OR TUBES*

	Standard Pipe	Line Pipe	Oil Country Goods	Boiler Tubes	Mechanical Tubes	O.D. and miscellaneous	Total
Hot Finished†	5,577	30,315	207,389	40,843	11,030	1,969	297,123
Cold Drawn	1,382	1,586	818	7,624	21,487	7,757	40,654
Total	6,959	31,901	208,207	48,467	32,517	9,726	337,777

LAP WELD AND BUTT WELD PIPE OR TUBES*

Iron	19,524	676	1,455	2,299		141	24,095
Steel	352,673	33,423	45,841	6,556		22,415	460,908
Total	372,197	34,099	47,296	8,855		22,556	485,003

ELECTRIC WELDED PIPE OR TUBES*

Iron	1,998						1,998
Steel	4,510	24,673	16,066	92	21,215	97,543	164,099
Total	6,508	24,673	16,066	92	21,215	97,543	166,097

* Production of black pipe, including stainless steel pipe and black pipe subsequently galvanized, sherardized, or enameled.
† Does not include hot finished tubes subsequently cold drawn.

EDITORIAL

Careful Preparation Will Aid Steel's Case at Washington

JUDGING from what is transpiring at the preliminary meetings of various industries on trade practice codes and at the Washington hearing on the cotton textile code, N. I. R. A. (national industrial recovery act) will bring out into the open many of the internal conflicts which have been raging for years within every major industry.

In the anthracite and bituminous coal industries smoldering animosities between small and large operators have flamed up in discussions on government control. In the soft coal industry sectional rivalries are being re-emphasized and differences of opinion between commercial and captive mine owners are rising to the surface.

Two weeks ago representatives of the independent marketing interests of the petroleum industry met in Chicago to discuss and pass upon a code which previously had been formulated by representatives of the major oil companies. It was a stormy session lasting three days, in which many differences between large and small companies were ironed out satisfactorily. However a deadlock in regard to lease and agency agreements occurred, which will be left for decision at the public hearing of the code before government representatives in Washington.

Experience of Cotton Textile Hearing Shows Need of Presenting Solid Front at Washington

Last week the hearing on the cotton textile code got under way. Here again the difficulty of securing agreements between large and small units and between sectional groups was encountered. Also the conflict between commercial and tire company owned textile mills was apparent. All of these disputes were further complicated by the studied effort made by union labor representatives to press its case at every opportunity.

If the experience of these several industries is a reliable criterion, the steel industry will be in for a hectic series of sessions when its code is submitted to the N. I. R. A. administrators. Practically all of the factors which have caused friction in the deliberations of the coal, oil and textile representatives are present in the iron and steel situation. While the feeling between large and small units seldom is expressed openly, it runs deep and might easily flare up in an animated discussion. The fact that some steel producers fabricate part of their own product and sell it in direct competition with their commercial customers is a sore point which may prove troublesome in formulating a code. The case of certain consumers who make iron or steel for their own use presents a problem similar to the captive coal mine and tire company owned textile mill situations.

If the discussion proceeds far into the subject of prices, there is no telling where it will end. A debate on single price versus quantity differentials will be precipitated. The old problem of concessions to favored customers would be hauled out for another airing. Basing points, freight rates, and numerous other details of the industry's complicated price structure would be brought into the discussion.

Endless Controversy Possible if Industry Fails to Prepare Adequately for Hearing

Union labor, of course, will do everything in its power to capitalize what seems to be a golden opportunity to win a foothold in the steel industry. The cause of labor relations has not been helped by the attitude indicated in the reported reference by Secretary of Labor Perkins to emergency company unions as "war bridegrooms," nor by the boast of union officials that company unions will be "laughed out of court."

In view of these many hazards, it behooves the iron and steel industry to do its best to compose its differences before its code is presented for public hearing. It is desirable that some of the internal problems that have lain dormant for many years be brought out into the open and thrashed out by the principals involved. However, this is a job for the industry itself, to be done within its own chambers. It would be unfortunate if the industry, through neglect or unwillingness were obliged to carry its internal dissensions to Washington, there to be aired before the eyes of government, public and other outsiders.

The cue for the steel industry is to complete its deliberations as soon as possible, to settle its affairs in semi-private council and to go to Washington prepared to present a solid, united front against the attacks of selfish outsiders who will be looking for vulnerable spots in steel's armor.

THE BUSINESS TREND

Employment Gaining, But Still Lags Behind Production

THE speed with which industrial activity has mounted in the last few months is amazing. After increasing from 60 to 67 in April, the federal reserve board's index of industrial production for May jumped nine points to 76.

An increase of nine points had been registered only once previously in the period covered by the reserve board's index; in January, 1920, the barometer leaped from 85 to 94. However the increase of 16 points in April and May combined has no parallel in the records. The nearest approach for any two consecutive months was in September and October, 1922, when a 10-point gain was recorded, and in August and September, 1924, when a 10-point increase also was registered.

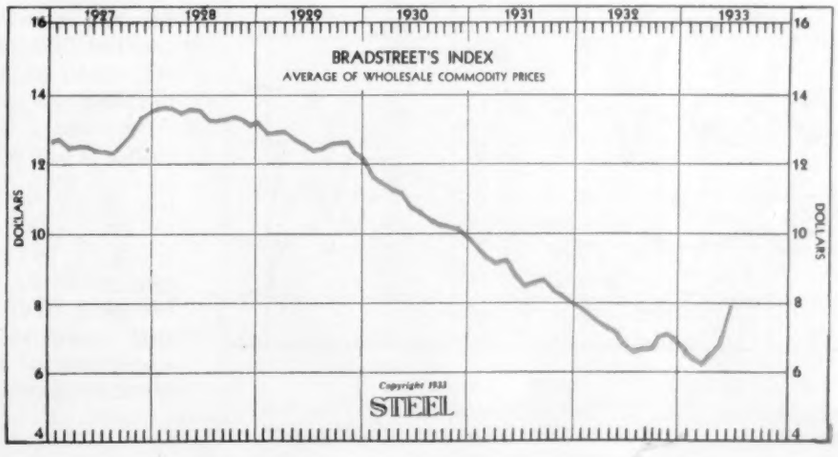
The index for June will show another gain of six and possibly more points, thus establishing a three-month increment far in excess of anything experienced in recent years.

Compared with the nine-point or 13.4 per cent increase in industrial production, factory employment in May went forward from 57.7 to 60.6, a gain of 2.9 points or 5 per cent. While the improvement in employment relative to industrial activity was more pronounced in May than in April, the lag still is disappointing. It is a curious fact that the only period since 1924 when the employment index was higher than the production index was in the four months of April, May, June and July of 1932.

Improvement More Widely Distributed, But Some Industries Still Await Business Gains

Signs that the accumulative effect of business improvement is penetrating more deeply into the ordinary walks of life are found in increased passenger traffic on railroads, gains of 20 per cent in hotel registrations in typical cities and modest improvement in retail store sales.

Nevertheless many sections of business still are untouched by the hand of returning prosperity. The situation is spotty, with need for further diffusion of improvement.

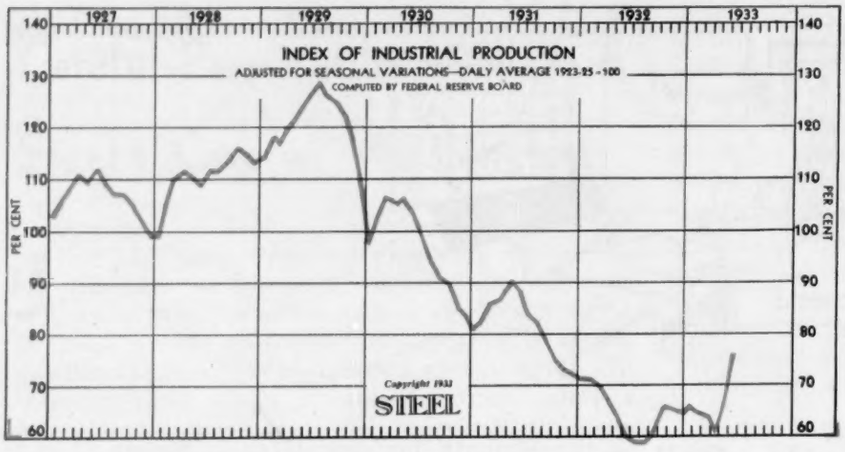


1933

June 1	$8.02
May 1	6.98
April 1	6.53
March 1	6.35

1932

June 1	$6.92
May 1	7.15
April 1	7.32
March 1	7.52



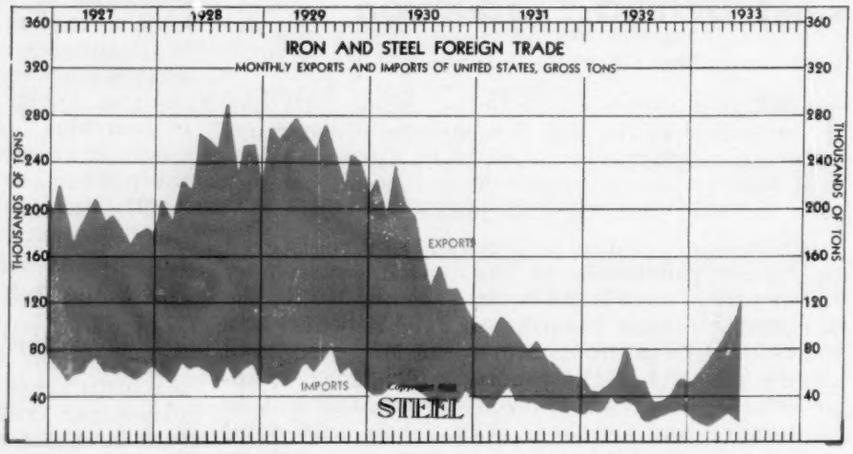
May, 1933	76
April, 1933	67
May, 1932	60

Industrial Production Index Rises Sharply in May

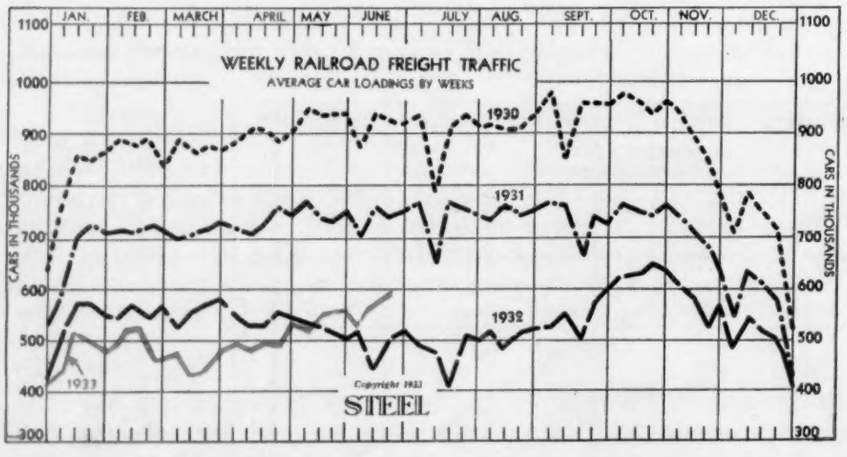
The index of industrial production as reported by the Federal Reserve board was up nine points in May to 76. This compares with 67 in the preceding month and 60 in May, a year ago. With the exception of the food products and anthracite coal industries, increases were general as compared with the preceding month and the corresponding month last year. According to the board's index iron and steel was up nine points to 49 in May, compared with 29 in May, 1932.

Trade Balance Broadens As Steel Exports Rise Sharply

This country's export trade in iron and steel products continues to show a favorable degree of expansion. Exports in May totaled 123,069 gross tons, the largest since October, 1930, when shipments reached 131,845 tons. According to statistics compiled by the iron and steel division of the department of commerce, May exports exceeded those of May, 1932 by 42,592 tons, or 53 per cent. Imports at 26,295 tons for May, showed a decline of 1766 tons from April and compares with the 39,751 tonnage imported in May, 1932.



Exports		Imports	
May, 1933	123,060	May, 1933	26,295
April, 1933	100,395	April, 1933	28,061
May, 1932	80,477	May, 1932	39,751



	1933	1932
June 17	587,931	518,398
June 10	564,546	501,685
June 3	508,234	447,412

Car Loadings Continue Gain; Nears 600 Mark

Loading of revenue freight for the week ending June 17 totaled 587,931 cars, the highest since early November, according to the report of the American Railway association. This was an increase of 23,385 cars above the preceding week, and an increase of 69,533 cars above the same week in 1932. Loading of all commodities, for the week increased over the corresponding week last year with the exception of merchandise less-than-carload lot freight.

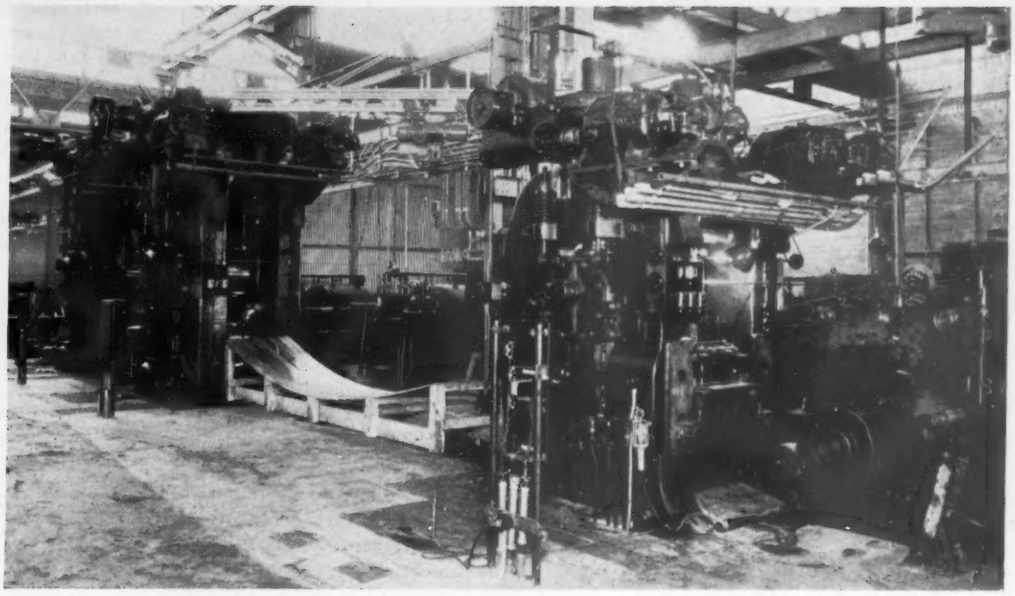


FIG. 1 — Stainless strip steel is rolled on this 3-stand 4-high mill in the plant of the Republic Steel Corp. The finishing stand is shown at the right

ROLLS FOR FINISHING STAINLESS STRIP STEEL REQUIRE MIRROR SURFACE

BY EDWARD S. HECK

STAINLESS steel strip, now fabricated into a wide variety of products, must compete with the finest nickel and chromium plated work. This necessitates an unusual degree of finish on the strip and likewise on the rolls producing it. To obtain the required mirror surface on rolls, cold mill engineers have been forced to develop special abrasive practice.

One of the large manufacturers of stainless steel strip is the Republic Steel Corp., Massillon, O., and this company has worked out a satisfactory roll finishing procedure. Classifying roughly the character of the work done, M. C. Corrigan, superintendent of the special products division, states that abrasive finishing operations on super-finished rolls begin where finishing practices on ordinary cold rolls end. In other words, a roll is taken from the rolling stand when the surface has deteriorated to a point that while unsatisfactory for the rolling of stainless strip would be considered perfect for an ordinary cold finishing roll.

Rolls to be ground are made of forged steel in diameters of 9¾, 12½, and 15 inches with working faces 20, 18, and 20 inches, respectively. The finish to be produced corresponds to that illustrated in Fig. 2.

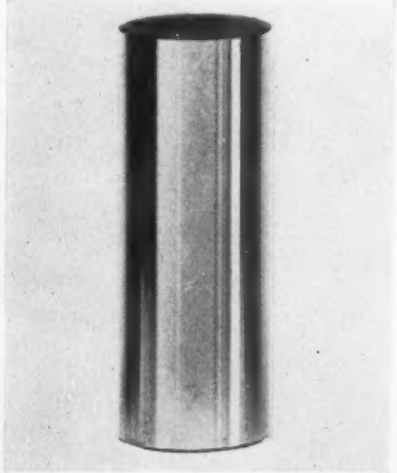


Fig. 2—The finish required on the cold mill rolls corresponds to that shown here

No universally accepted standards of surface or finish exist, making it necessary to consider briefly what is meant by these terms. There is some disagreement as to what constitutes a perfect roll surface. Often a higher luster simply disguises an unsatisfactory surface which in practice soon breaks down and mars the work. Again, the mat or dull finish may represent a geometrically perfect surface.

The strip rolls under discussion first must be ground to commercially perfect geometric accuracy, but in addition must have a so-called mirror finish. It is quite obvious that the reason for such surface perfection is to avoid a pattern which would be reproduced on the surface of the strip by any irregularity of the roll surface. Since the stainless strip is polished under flexible buffing wheels, it easily can be appreciated that any

marks left by the rolls must be removed by additional buffing at extra cost. Hence, great care must be used in grinding the rolls for it is much cheaper to produce a nearly perfect surface on the strip as it comes from the mill than it is to produce a poor surface and consequently remove the imperfections by extra polishing and buffing before delivery to the customer.

Details of the exact abrasive process used in the roll grinding are constantly being varied with the idea in view of bettering the final result, according to officials in charge of the process. At the present writing, the process in use produces a roll surface that would have been considered ideal a few months ago, but it is believed that even this can be improved upon by continuous research.

The roll to be ground is placed on the machine shown in the background of Fig. 4, a 20 x 96-inch machine built by the Landis Tool Co., Waynesboro, Pa. The first grinding or roughing is performed with a 150-grit, grade R, bond 24, wheel supplied by the Carborundum Co., Niagara Falls, N. Y. The wheel is 24 inches in diameter and 3 inches wide with an 8-inch bore. Wheel speed is held carefully to 796 revolutions per minute as recommended by the manufacturer. Thus, the cutting speed is 5000 surface feet per minute. The roll revolves at 100 revolutions per minute.

Three Initial Cuts Taken

Maximum allowable stock removal of the first grinding is 0.010-inch on the diameter. Such stock removal is ample to clean up any imperfections which have developed in the roll surface. Usually three cuts are taken in the first grinding process to obtain the desired results.

Wheel surface for the first cut is prepared by open truing with the diamond point, that is, the diamond cuts deep enough and traverses the cutting surface of the wheel at sufficient speed to produce an open, free-cutting, surface on the 150-grit wheel used. Successively finer truing with the diamond is used on second and third or sparking-out cut. The wheel travel for the first cut, is ¼-inch per work revolution. The second cut is made with a travel of ⅛-inch and the third with 1/16-inch travel.

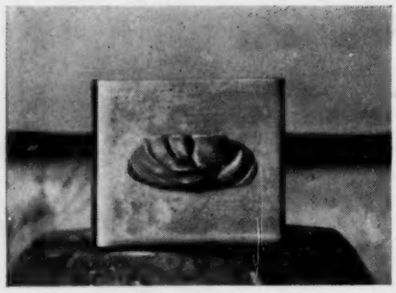


Fig. 3—Section of a roll showing how concentric cracks form under severe heating stresses when too much pressure is used in grinding

The second step in building up the mirror surface is done with a special, synthetic resin bond, fine-grit wheel also made by the Carborundum Co., and specified as KHM grade 12, bond K 12 Y. The intermediate wheel is the same size and diameter as the first wheel, but the cutting speed is increased to 1034 revolutions per minute which gives a surface speed of 6500 feet per minute. Traverse, as before, is ¼, ⅛, and 1/16-inch per revolution of the work respectively for first, second, and sparking-out cut. Maximum stock removal is 0.003-inch on the diameter.

The final cut necessary to produce a mirror surface, and not only a mirror surface as was explained before but a surface which is geometrically accurate, depends in a large measure on the wheel used. A burnished surface which is made bright simply by flowing the metal over scratches left by previous grinding as would be done by a dull or loaded wheel is not to be desired. The reason is that such a surface soon breaks down, exposing the sub-surface scratches which will pattern or mar the steel strip.

When the nature of the rolling process is considered, it can be seen that the durability of the roll-surface is one of the prime factors of importance. An 8 or 10-foot stainless steel slab 3 inches thick and 16 inches wide may be rolled out to a final length of 6000 or 7000 feet. No trouble is experienced from inclusions in rolling narrow strip as is sometimes the case with sheet, but the condition of the roll surface and its long life place a real burden on the abrasive processes and the grinding wheels especially developed to meet the need.

Grit Size Must Be Uniform

The wheel must cut rather than burnish, and the grit must be so fine as to bring about a mirror surface. According to the makers of the wheel used in the final process the grit powders are as perfectly uniform in grit size as science and skill can make them. At the same time they still have the power to cut clean and fast. The grit is of the same order of fineness as the 600-grit powders, but is in fact finer, being graded by an elaboration of the process followed in grading abrasive powders by flotation. The wheel used is specified by its makers, Carborundum Co., as KAM bond 910E.

The maximum traverse with the final wheel is ⅛-inch per work revolution and the traverse drops to 1/16-inch for the final sparking-out

FIG. 4—Because of the high finish required on the stainless steel strip, the rolls must be ground to a mirror surface. The roll grinding machine is shown in the background

cut. The work speed remains at approximately 100 revolutions per minute. The wheel is the same size as the roughing and intermediate wheels, but its speed is substantially lower, being 557 revolutions per minute, or 3500 surface feet per minute.

The foregoing outline of abrasive processes simply serves as an indication of the work done. The real secret of perfection of result, if it may be called a secret, lies in the utmost care in every detail of the work. The roll neck bearings, the grinding wheel spindle bearings, the drive mechanism, the truing diamond and every other part of the apparatus used must be kept commercially perfect. When a part is specified to be commercially perfect in the special products division of Republic Steel Corp. it means that that part must be as perfect as is possible with modern optical and mechanical gages.

Great care is exercised to keep the roll grinding room free from dust with ventilators arranged with that idea in view. The coolant is pure, softened water carrying only a small amount of cutting compound. This coolant is used only once to avoid particles of grit which might be carried into contact with the work were the water re-circulated.

Overcome Many Difficulties

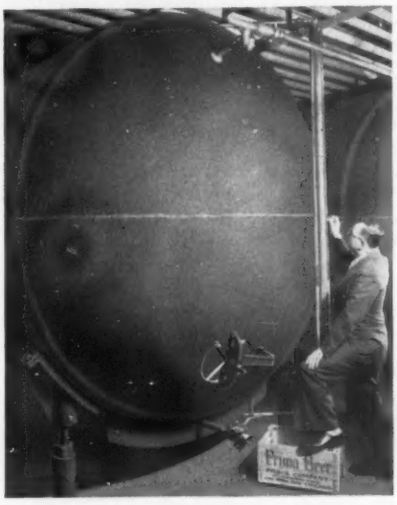
Among difficulties which have been overcome in developing fine roll grinding might be mentioned: Vibration, stresses due to mis-alignment, heating, and traverse or wheel marks. Vibration is avoided by the greatest care in keeping the wheel spindle bearings in perfect condition. Roll and spindle drive mechanism is adjusted to just the right tension to avoid belt whip and uneven driving speed. Driving pins make contact with the roll through small rubber cushions to avoid centrifugal vibration. Faults due to mis-alignment are kept to a minimum by constant inspection of neck-rests or stays. Heating is kept in control by ample coolant and by taking light cuts. Wheel edges are stoned and only good, sharp diamonds tightly held in the dressing tool are used for perfect truing as a preventative of wheel marks.

A word more might be said about heating. The rolls are hardened alloy steel with a scleroscope hardness of 90 to 100. Consequently any burning of the surface caused by grinding pressure too great, results in checks or cracks in the surface. These cracks may be invisible on the highly finished surface even when examined with a microscope, but after a brief period of usage they come out on the roll surface and result in serious marring of the work. These cracks may grow deep into the roll surface and result in checking as deep as that illustrated in Fig. 3. The chip shown is about ½-inch long by ¼-inch deep and is a section showing how concentric cracks form under severe heating stresses. The top of the chip was on the surface of the roll, and the curved striations extended into the roll concentric about a point on the surface.

There is no shortcut in producing precision rolls. The solution lies in taking plenty of time and avoiding heavy cuts. As much as three hours may be spent in re-grinding a roll, and longer if a crown of 0.002 to 0.005-inch be required.

The roll, still on the machine when the grinding is finished, is dried thoroughly, cleaned with whiting, and covered with heavy grease. A spiral strip of heavy paper then is wound over the roll surface. Canvas was used previously for protecting the roll surface but it was found that dust and grit collected in the weave of the cloth and imprinted the pattern of the cloth on the surface of the roll.

Rolls after grinding are placed on finishing mills (last stand) where they have a life of approximately 8 hours. The surface by that time has deteriorated somewhat and the roll is transferred to the second stand where its effective life is about 18 hours. The roll then is used for roughing on the first stand where it remains for about 1½ days before re-grinding is necessary.



TANKS OF STAINLESS CLAD: Among recent equipment installed at the Prima Co. brewery, Chicago, were three 150-barrel government measuring tanks for beer storage. The tanks, field constructed and welded throughout, are of stainless clad steel, with a 20 per cent thickness of 18-8 chrome-nickel steel in the inside, fabricated by Ingersoll Steel & Disc Co., Chicago. Walls are ¼ inch; heads 5/16 inch. Frequent tests since installation of the tanks have shown the steel to be entirely nontoxic to the beer, and no discoloration or corrosion of the metal has occurred

New Beer Barrel of Composite Design

A NEW type of steel beer barrel, with an inner shell of stainless steel and an outer shell of mild carbon steel, will be introduced to the trade shortly by Ingersoll Steel & Disc Co., division of Borg-Warner Corp., Chicago, which recently entered into contract with the Ludlum Steel Co., Watervliet, N. Y., the latter organization to supply the stainless steel.

The barrel was designed by the Krupp Works, Essen, Germany, which has licensed manufacture of the barrel in the United States to the two companies named above. Thus the two American companies will have the benefit of experience and engineering co-operation of the Krupp organization.

Insulated by Air Layer

The two shells of the barrel, the inner of stainless or stainless-clad steel and the outer of mild carbon steel processed to resist corrosion and coated with baked enamel, are in direct contact only at the two openings in the barrel. The air space between the cylindrical shells provides insulation against either heat or cold. A gasket of insulation is placed between the shells at the two ends to serve also as insulation.

A slight barrel-shape is given the inner shell to insure proper filling, and the exterior shell has the form of the usual wooden barrel. The outer shell is reinforced by two rolled rims, or tires, and four pipes welded onto the inside as well as by a central gusset of rectangular cross section. The ends have two protruding guards to insure convenient handling.

Advantages of the stainless steel beer barrel are well known among breweries, but the high cost of this equipment has militated against its use. This new composite type of barrel, it is reported, can be sold at prices commercially practicable. Rapid cleaning and elimination of the need for pitching the interior are salient features of the stainless steel design.

New Castle Plant on Full

American Sheet & Tin Plate Co.'s New Castle, Pa., works now has the remaining eight of its 20 hot mills in operation. The mill resumed approximately two weeks ago with 12 mills on after idleness since December, 1931.

Seek To Eliminate Dust in Foundry Operations

GOOD housekeeping, a new topic for discussion, but a subject which has received considerable attention in a large number of foundries during the past year, attracted a large attendance of interested foundrymen at the annual meeting of the American Foundrymen's association in Chicago recently. The meeting was arranged jointly by the foundrymen's association and the National Founders' association.

Dr. E. G. Meiter, Employers Mutual Liability Insurance Co., Milwaukee, spoke on the dust problem in the foundry industry and outlined various factors which must be taken into consideration in any program of good housekeeping in the foundry. He also described the operation of equipment which has been developed to take dust samples and make a count of the dust particles in the air. The samples are taken at the breathing level of the worker at the particular point where the test is to be made, and a certain advantage results in taking the sample over a long period.

A thorough house cleaning is the first step in any program of dust elimination. Continuous vibration causes fine dust to fall from rafters and beams and therefore such accumulation must be removed and all other places where dust may accumulate must be cleaned. Several methods have been tried in different foundries, including the following: Use of water under pressure; blowing off with compressed air, which removes the dust but scatters it throughout the shop and some again will settle on the places being cleaned; brushing; vacuum cleaning; a combination of air and water; sandblasting and then painting; and with steam.

Attack Source of Dust

Following the house cleaning, it is necessary to eliminate as much dust as possible at the source. In this, studies have shown that much progres can be made with the equipment on hand. The program should include the following steps: Good housekeeping; elimination of bad practices; proper maintenance of equipment and keeping it in air tight condition; proper maintenance of dust collecting equipment; isolation of dusty processes as much as possible; the ventilation of certain operations which previously have not been considered dusty; and supplying workers exposed to dust which otherwise cannot be controlled with proper helmets and respirators.

Legal aspects of the question and employer responsibility were outlined by Alfred C. Hirth, Williams, Eversman & Morgan, Toledo, O. A. D. Lynch, personnel director, Ohio Brass Co., Mansfield, O., drew on his personal experiences for interesting information regarding the stimulation of foremen's and workers' interest in keeping a clean and orderly foundry.

Interesting features in connection with the value of the impact test, hot tears in steel castings and the advantages of radiographic inspection precipitated extensive and animated discussion at a technical session on steel founding.

D. Zuege, Sivyer Steel Castings Co., Milwaukee, stated that great care must be exercised in drawing conclusions from the impact test, presenting as it does many opportunities for falling into error. Many factors must be taken into consideration and then correlated before arriving at a decision.

Cites Value of Annealing

Herbert J. Blosjo, Minneapolis Electric Steel Castings Co. Minneapolis, discussed some of his experiences in testing cast steels and claimed that a good anneal gives best results in castings subjected to impact test. He also found that results of various forms of test bear an approximately definite relationship to each other.

A. W. Lorenz, Bucyrus-Erie Co., Milwaukee, favored a movement to standardize test notch sizes for purpose of intelligent comparison. He disclaimed confidence in tests taken from small bars and quoted experiences at the Watertown Arsenal, Watertown, Mass., to bear out his contention.

Six papers were presented at two malleable sessions. In one paper, Rebecca Hall, metallurgist, Chicago, discussed high-strength wear-resistant malleable iron. In an attempt to develop a wear-resistant malleable iron, the author experimented with the effect of chromium additions plus silicon control.

The product sought was a casting of high strength, moderate ductility and considerable resistance to nonlubricated abrasion. The regular anneal was given to the castings which were made by ladle additions to standard metal. These additions ranged from 0.25 to 1.15 per cent, with the silicon varying from 1.02 to 3.02 per cent. Chromium of 0.84 per cent, wih 1.57 per cent silicon was found to give the maximum tensile strength. Elongations decreased and hardness increased with higher chromium contents. Elastic limits rose up to 62,500 pounds per square inch.

Possibilities of reducing the time necessary for the production of malleable iron were pointed out in a paper by A. E. White and R. Schneidewind, department of engineering research, University of Michigan, Ann Arbor, Mich. Three groups of irons were investigated, the first consisting of specimens of standard foundry composition, the second and third being made in a rocking-arc electric furnace of low-carbon and low-silicon type. Superheat temperatures ranged up to 2970 degrees Fahr. for the commercial irons and up to 3180 degrees for the electric furnace irons. It was the authors' conclusion that superheating coupled with good furnace design is capable of reducing normal malleableizing cycles up to 50 per cent.

Malleable Iron Production

Dr. H. A. Schwartz, National Malleable & Steel Casting Co., Cleveland, spoke on annealing, and described how various contradictory and diverse opinions regarding factors relating to malleable iron production have arisen. High-temperature properties of malleable iron were discussed by H. W. Mack, Crane Co., Chicago.

Considerable comment on the subject of pouring temperatures followed a paper on cracks and pouring temperatures by E. M. Handley, Chain Belt Co., Milwaukee. The author described how cracks were eliminated from certain castings by a moderate reduction in pouring temperature. While these results were substantiated by experiences of others, proper temperatures were found to vary according to type of castings and composition of the metal.

Materials handling problems held attention at a joint meeting with the American Society of Mechanical Engineers. Considering the economical application of mechanical equipment to foundries with small or intermittent ouput, Max Amos, Standard Automotive Parts Co., Muskegon, Mich., described the installation and operation of sand handling equipment in the plant with which he is connected.

Small molds are dumped by hand into a bucket suspended from a monorail. The castings are removed by hand and the sand is dumped into a storage bin. The cooled sand is treated in batches in a muller and discharged into buckets suspended from the monorail which convey the sand to a point above any of the

molding machines. Criss-cross chains attached to bars on top of the bucket by springs and to the clamshell doors or gates at the bottom, prevent the sand from arching or clogging in the buckets. New sand is added to the supply at the discretion of the sand mixer, and in conformity with the requirements of any class of castings.

The field of material handling equipment in semi-production foundries was described in a paper presented by R. G. Wieland, Forest City Foundries Co., Cleveland. Good flexibility is required in the style and scope of equipment on account of the diversity of output and the lack of long running orders on duplicate castings. So far as possible the equipment should be designed to prevent the necessity for any back tracking.

In the discussion which followed attention was directed to the fact that in recent years foundrymen and equipment manufacturers have arrived at a better understanding of the suitability and application of mechanical equipment in the foundry. The meeting closed with a discussion on the relative merits of hand and mechanical charging methods for the cupola.

Electric Furnace Melting of Gray Iron Studied by Foundry Tests

PROBLEMS relating to melting in the electric furnace, air furnace and cupola were considered at a session on cast iron during the meeting of the foundrymen's association. C. R. Culling, Carondelet Foundry Co., St. Louis, relating experience of a gray iron jobbing foundry with the rocking-type electric furnace, showed that increased strength, increased density as desired and improved machinability were possible with that type of melting medium. Charges consisted of steel scrap and cast iron borings and care was taken to standardize each car or shipment of borings.

Mr. Culling, in response to a question, stated that the cost of current was considerably higher than that of coke, but this was offset partially by the use of cheaper materials, the final cost being comparable with high grade cupola operation.

D. P. Forbes, Gunite Corp., Rockford, Ill., discussed air-furnace cast iron, noting that important factors in this method of melting include design of the furnace, selection of raw materials, adherence to a definite program, and the employment of a skilled operator.

Locate Cupola Near Furnace

He stated that it was desirable to have the cupola used in duplexing as near the air furnace as possible. His company uses a spout direct from the cupola to the furnace, with a small receiver between in which fused soda ash is added. This arrangement permits use of the air furnace for either batch or continuous pouring. A 15-ton heat usually is ready for pouring 6¾ hours after the furnace is lighted and the furnace is empty in 7½ hours.

Discussion brought out the fact that the longer melting time required in this process eliminates the necessity for superheating. In reply to a question as to what constitutes superheat, Mr. Forbes stated that the iron was poured between 2700 and 2900 degrees Fahr.

Effects of slag on cupola operation and metal structure were outlined by R. H. Bancroft and A. C. Meyers, Perfect Circle Co., Newcastle, Ind., who reported the results of a series of tests in which the flux consisted of all limestone, all dolomite and a mixture of dolomite and limestone. This investigation led the company to standardize on a flux with 62 per cent dolomite, 22 per cent limestone and 16 fluorspar.

Reports Melting Practice

Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., presented a paper prepared by C. L. Frear, DeLaval Separator Co., Poughkeepsie, N. Y., citing practical experiences with electric furnace iron. Details were given of a method of melting gray iron in the direct-arc electric furnace, as well as the operations desirable or necessary to produce soft, easily machined but close grained castings, even using a large amount of steel and cast iron scrap, including chips and borings, and a correspondingly small amount of pig iron in the charge.

Properties of gray iron as affected by casting conditions were enumerated by C. M. Saeger Jr., and E. J. Ash, bureau of standards, Washington, who discussed various additional factors, including the effect of superheat on the strength of cast iron as shown by test bars. The authors reported that high-carbon irons are effected more by superheat than are low-carbon irons.

G. F. Comstock, Titanium Alloy Mfg. Co. Niagara Falls, N. Y., discussed titanium in cast iron, recording the results of four tests, one on cupola metal and three on electric furnace iron, and pointing to the availability of titanium and chromium in making high-test iron.

Silal and nicrosilal heat-resisting cast irons were described by A. L. Norbury and E. Morgan, Birmingham, England, in a paper read by J. S. Vanick, International Nickel Co. Inc., New York. This contribution was a general account of properties of two cast irons recently developed by the British Cast Iron Research association. John Shaw, an English visitor, offered several comments on the irons, pointing out that while the composition may be right the material possibly will fail if the structure is not right.

The French exchange paper "Martensitic Quenching of Cast Iron," by G. R. Delbart, Ateliers des Anciens Etablissements Cail, Denain, France, was presented by H. Bornstein, Deere & Co., Moline, Ill. To secure the best results in martensitic quenching, M. Delbart reported, the graphite should be as low as possible, the graphite should be fine and round in shape, the chemical composition must be correct and quenching must be accomplished at the lowest possible temperature. The author also discussed the effect of silicon, magnesium and nickel on martensitic quenching and pointed out that magnesium favors that type of treatment when it exceeds 2 per cent.

Investigate Bearing Bronzes

At one of the nonferrous founding sessions C. S. Cole, Copper & Brass Research association, New York, presented an abstract of a paper prepared by himself and Dr. O. E. Harder, Battelle Memorial institute, Columbus, O., on an investigation of six bearing bronzes. Data were presented on tensile and yield strengths, elongation, reduction of area, hardness and resistance to pounding. Attention was called to the fact that strength obtained was considerably higher than is called for in the standard specifications for the several alloys tested. Discussion developed the information that steel-back babbitted bearings are used on the basis of price consideration and higher strength, but that steel-back bronze bearings are gaining favor.

Representatives of industry and educational institutions teaching foundry practice met in conference to discuss common problems pertaining to furthering the interests of the foundry industry.

Dean C. J. Freund, Detroit university, Detroit, opened the discussion with the statement that educational institutions today need the same type of co-ordination with industry that industry now maintains with its trade and technical associations. He felt that the task of maintaining

these contacts rests largely with the educators. Carl Casberg, University of Illinois, Urbana, Ill., took issue with this opinion and declared that industry itself should endeavor to contact the college and university faculties.

The splendid service which many colleges and universities are providing industry was stressed by W. D. Moore, American Cast Iron Pipe Co., Birmingham, Ala., who pointed out that the pipe industry could not have reached the high position it now occupies without the co-operation which has been given. His firm makes a definite practice of taking a certain number of college graduates each year, and after a period of training in the various phases of foundry practice, some have returned to the colleges as instructors. Later, some again have returned to his company, thus cementing the bond of interest between the two organizations.

Prof. A. E. Wells, Cornell university, Ithaca, N. Y., was of the opinion that the plan of providing work in foundries for students during the vacation periods between the second and third and the third and fourth years aids materially in creating an interest in the industry and its product among engineering graduates.

Review of World Research on Alloys of Iron Reported 70 Per Cent Complete

SATISFACTORY progress has been made during the past year by the Alloys of Iron Research, critical survey of research on iron and its alloys as reported in the technical literature of the world. Shortage of funds has hampered the work somewhat, according to progress report No. 3, recently issued by the Engineering foundation, New York, which organization, in co-operation with a number of leading iron and steel companies, is sponsoring the work.

The publication program is but slightly behind the schedule outlined in the last progress report (STEEL, Aug. 1, 1932, p. 27). One book, *Alloys of Iron and Molybdenum*, has been published; another, *Alloys of Iron and Silicon*, will appear about Sept. 1; and the manuscripts of three more are nearing completion, according to Frank T. Sisco, editor of the survey.

The critical review of the world's research on alloys of iron, alloy steel and alloy cast iron is about 70 per cent complete. Of the important journals whose editorial content is confined to reports of metallurgical research, nearly all in German and French have been reviewed completely from 1899 to 1932, and the useful data abstracted and filed. Several publications in Swedish, Italian and Russian also have been abstracted. Lack of funds has held up to a certain extent the abstracting of British and American publications. As of June, 1933, tabulation shows 4650 papers reviewed and 12,504 abstracts prepared.

Complete Data on File

As an example of the completeness of the abstract file, for those interested in corrosion there are available 823 abstracts which give data on the effect of 31 elements and compounds on the corrosion of iron and steel. Similarly, 633 abstracts are available under the heat treatment classification. Abstract material is classified under 21 headings as each is related to 35 elements. All these data are available to participants in the Alloys of Iron Research. A reasonable charge is made to companies and individuals not participating in the work for reference to the data.

The following summary gives an indication of the present status of the publication program:

Alloys of Iron and Molybdenum, by J. L. Gregg of Battelle Memorial institute, a part of the Institute's contribution to Alloys of Iron Research, was published Dec. 1, 1932. The book contains 500 pages, 150 tables, and 154 illustrations. To prepare the manuscript, more than 800 technical articles on molybdenum in iron and steel were carefully studied. The bibliography of the monograph contains 515 references.

Alloys of Iron and Silicon, by Earl S. Greiner, J. S. Marsh and Bradley Stoughton, is in press, and will be published Sept. 1. The book will contain more than 450 pages, 146 tables, and 124 illustrations. To prepare the manuscript, nearly 1000 technical articles on silicon in iron and steel were reviewed and abstracted. The bibliography will contain 425 references to the most important of these.

Intermetallic Equilibria, authorized by the Iron Alloys committee on Feb. 20, 1932, is being written by J. S. Marsh, associate editor, Alloys of Iron Research. The object is to provide an elementary theoretical discussion of heterogeneous equilibrium in metallic systems so that discussions of constitution, especially of ternary alloys, in the other books will be more readily understandable. This special monograph, on a subject for which there is no English textbook, will be of value as a college text. The manuscript will be ready for the publisher by Sept. 1.

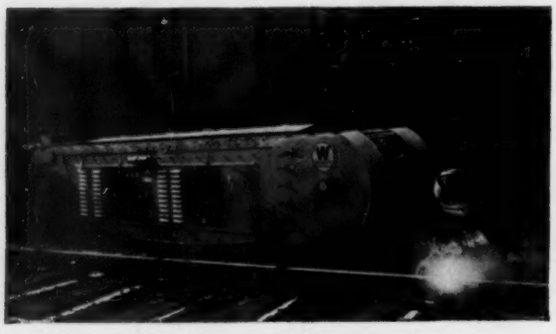
Alloys of Iron and Tungsten: The manuscript, prepared at Battelle Memorial institute, is being reviewed by the co-operating experts. It should be ready for the publisher in four or five months. Publication is scheduled for the spring of 1934.

Alloys of Iron and Copper, also being prepared at Battelle Memorial institute, is nearly completed in manuscript. It should be ready for review by the consulting editors in the fall of 1933 and should be published in the summer or early fall of 1934.

Alloys of Iron and Nickel: The manuscript will be prepared by the editorial office with the co-operation of the research and development department of International Nickel Co. Inc. The survey of the literature is nearly completed. Work on the manuscript will be started as soon as the special monograph on intermetallic equilibria is finished. Publication is scheduled for early 1935.

Alloys of Iron and Carbon: The first portion of the manuscript has been written at Battelle Memorial institute and is being reviewed by the consulting editors. Work is in progress on other portions. Publication is scheduled for 1935.

Other Books: Progress has been made during the past year in reviewing the literature for monographs on pure iron, iron-chromium, iron-vanadium, and iron-manganese. No estimate can be made at present of the dates for their publication.



CATERPILLAR TANK CARRIES WELDER: Developed to fill the need for a mobile power supply unit which does not require frequent transferring to and from the track for movement, this ingenious tractor welder is one of six purchased by the Lehigh Valley railroad from Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for track maintenance work

IMPROVING OPEN-HEARTH FURNACE DESIGN

BY WILLIAM C. BUELL JR.

Part V—Open-Hearth Furnace Lines

(Thirty-Ninth Article of Series)

THE relations of bath dimensions to bath area, volume and the tonnage of molten steel contained in the bath are arranged for graphic solution in Fig. 56. This takes account of metal volume only, and slag volume must be added as one-half the bath area. To use the chart enter the left hand scale at the bath length and proceed horizontally to the bath width. A vertical line from this intersection to the lower scale gives the bath area computed in accordance with the method indicated at the lower right. This vertical line is extended upwards to the bath depth, the total distance between the foreplate line and the bottom of the bath at its maximum depth, but which represents a molten metal depth 6 inches less than the overall figure.

A horizontal line is next extended from the last intersection to the volume coefficient line. A vertical line from the coefficient line to the upper scale is the volume of steel in cubic feet that the bath will hold at normal rating. The diagonal of the coefficient K = 0.55 is the average value for the furnace under discussion.

Indicates Holding Capacity

The vertical line then is extended downward to intersect the diagonal of weight of steel per cubic foot; 430 is sufficiently correct for most cases and from this last intersection, a horizontal line to the scale at the right indicates the holding capacity of the bath in gross tons. The example indicated is for a furnace with a bath 36½ feet long, 14 feet wide, giving a bath area 470 square feet. The bath depth is 33 inches giving a metal depth of 27 inches. The volume is 590 cubic feet and the metal holding capacity, at 5.21 cubic feet per ton, 112 gross tons. If the volume available for slag is one-half the area it will be 470 ÷ 2 or 235 cubic feet. The sum of the volumes or 825 cubic feet is the approximate total volume of the bath below the foreplate line.

While the volume as calculated always is subject to variation and, therefore, never can be other than an approximation, the actual volume actually occupied by the molten steel may be determined accurately from the ingot weight of a heat by taking the ingot weight as moved to the mills, adding thereto a weight representing the average pit loss which is ordinarily about 4 per cent and multiplying the weight of the total metal tapped by 5.21, the number of cubic feet in 1 gross ton of steel.

The use of Fig. 56 also offers a simple method of determining the probable depth of the metal should it be desired to make a larger tonnage than that for which the bath was designed. For example, the bath just specified is calculated to have a normal capacity of 112 gross tons. It is desired to tap 150 tons of steel. What will be the metal depth?

Enter the right hand scale at 150 tons and carry a horizontal line to the appropriate line designating the weight of metal per cubic foot. From this intersection a vertical line to the upper right hand scale gives 780 cubic feet and is the metal volume. A horizontal line from the intersection of the coefficient diagonal to intersect the vertical line of area previously drawn will spot the approximate metal depth in this case as 36 inches. Thus, it is evident that with the enlarged tonnage the upper surface of the molten steel will be above the foreplate line. Although having the steel up to or

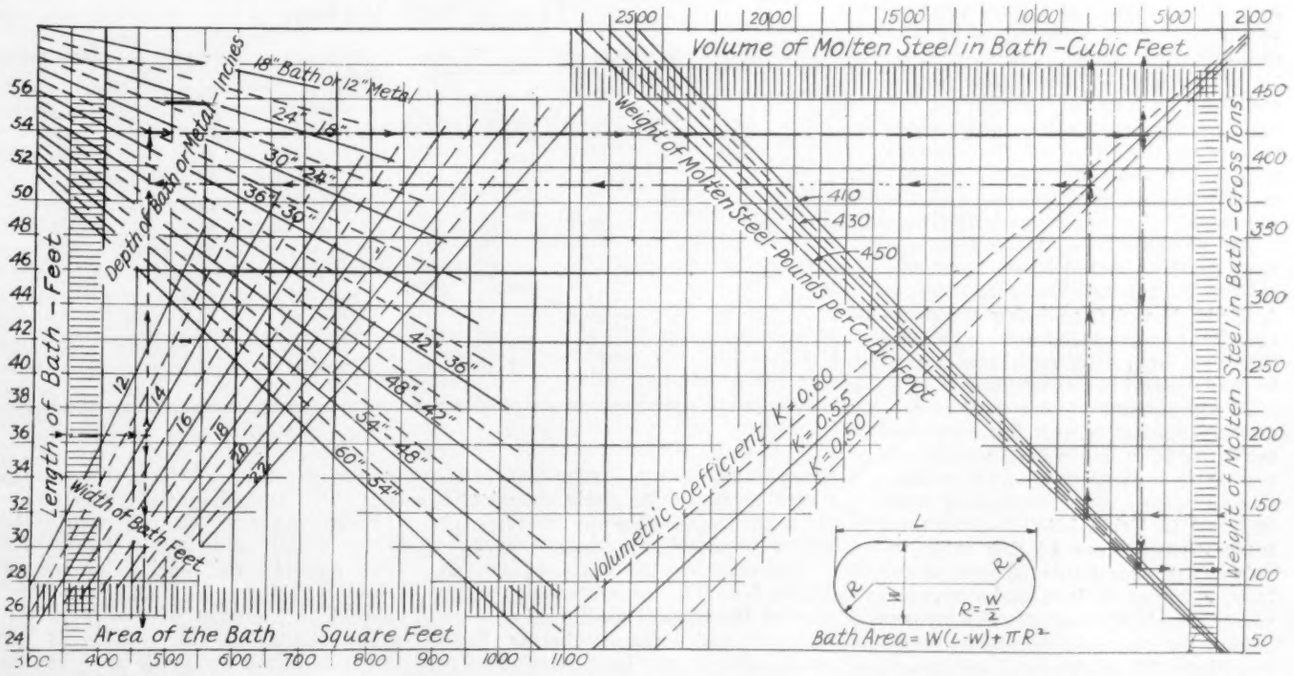

Volume of Molten Steel in Bath - Cubic Feet
Weight of Molten Steel - Pounds per Cubic Foot
Weight of Molten Steel in Bath - Gross Tons
Length of Bath - Feet
Width of Bath Feet
Depth of Bath or Metal - Inches
18" Bath or 12" Metal
Volumetric Coefficient K = 0.60
K = 0.55
K = 0.50
Area of the Bath Square Feet
Bath Area = W(L-W) + πR²
R = W/2

Fig. 56—Graph showing relations of bath dimensions to bath area, volume and tonnage of molten steel in the bath

even above the foreplate line often is practiced, it is not believed that such procedure can be justified other than in the case of an occasional large heat for some special purpose.

Comparisons of the designer's tonnage rating with tonnage ratings as calculated by the method of Fig. 56, and the tonnages actually being produced in the several furnaces are listed conveniently in Table LXVII. The values of columns h, i and j considered jointly are reasonably close to each other in the cases of furnaces B, C, D, G, I, J, K, L, M, O, and P. No closer results could be anticipated in view of the many possible variables that enter into a consideration of tonnage capacity through the effects of the constantly changing bottoms and the tolerances of charging and finishing.

As compared to the calculated normal steel volume of the bath, column m, it is indicated that furnaces A, E, H, N and O probably are operated at such abnormal capacities that best operating costs are not to be had under the conditions.

A comparison of the hourly production against a unit bath volume, taken as 1000 cubic feet, which is a precise comparison of one furnace to any other, as a steelmaking unit, is listed in Table LXVIII. The most interesting feature of this table involves the production figures of the four furnaces of largest holding capacity M, N, O and P which have production values about one quarter less than the others as a group. All of the larger furnaces have relatively short baths, and in view of the forcing required to secure the production of the units in a satisfactory time, it is thought that the cause of the drop in production rates may be found in the fuel practice and flow factors.

Although the other furnaces, omitting reference to furnace C, are grouped closely it is believed that those showing the larger unit tonnages may develop their superiority through more liberal design, or better fuel and melting practice.

Undoubtedly, the unit figures of Table LXVIII are more comprehensive of the overall ability of a given furnace and offer a better basis upon which to base comparative performance than any others that have been developed to date. Actually, they include direct reference to the tonnage of steel produced, the relative size of the furnace to the production, the fuel practice and indirectly the melting practice.

Perusal of the figures of rating columns h, i, and j of Table LXVII, shows that only in the cases of furnaces C, D, G, J, K, M and P are the several values sufficiently close, one to the other, to make the usual arbitrary rating method reasonably indicative of the actual metal holding or ingot capacity of the unit. As the foregoing furnaces represent a minority of those listed, the present method can not be relied upon as presenting accurate information. As a means of more accurately indicating the actual capacity of a furnace, a permanent designation of rating should be omitted until a sufficient operating time shall have elapsed to establish proper working conditions and then the furnace rated; not on ingots produced, but on total metal tapped. The latter is suggested on the grounds that pit and ladle losses are a function of plant practice and, as such, are not chargeable against furnace operation.

If this method were followed, then the furnaces included in this treatise would be rated at round figures in accordance with column k, Table LXVII. If such a term as above was to be preceded by a term designating the theoretical holding capacity of the furnace in round figures then the combined term becomes descriptive of the furnace as designed and operated. The theoretical capacity figures would be those of column g, Table LXVII. Yet this double term contains no indication of operating practice. This would be included were a term suffixed signifying the volume of the bath required to produce 1 ton of steel per hour. This at once gives

Table LXVII

Comparison of Designer's Tonnage Rating of Open Hearths with Calculated and Actual Tonnages and Volumes

Furnace	Bath		Calculated Normal Values			Gross Tons		Designers Rating	Actual Results			Per Cent Of	
			For	For	Total	To Tap	Ingots		Gross Tons		Volume	Normal	Total Vol.
	Area, Ft.²	Depth, Inches	Metal, Ft.³	Slag, Ft.³	Bath, Ft.³	100%	96%	Gr. Tons	Ingots 96%	Tapping 100%	Metal, Ft.³	Metal Volume	Below Foreplate Line
a	b	c	d	e	f	g	h	i	j	k	l	m	n
	Table	LXIII	Fig 56	b/2	d+e	f/5.21	g x 096	Table I	Table LV	j/0.96	k x 5.21	l/d	l/f
A	468.9	33	581	234.5	815.5	111.5	107.0	150	150.0	156.3	815.0	140.3	100.0
B	454.9	33	562.5	227.5	790.0	1080	103.6	100	119.8	124.9	651.0	115.6	82.5
C	478.7	32	569	239.5	808.5	1092	104.8	100	110.0	114.6	597.5	105.0	74.0
D	514.4	32	613	257.0	870.0	117.7	112.9	100	113.8	118.6	618.2	100.8	71.1
E	494.1	33	610	247.0	857.0	117.1	112.4	125	154.0	160.5	836.5	137.2	97.6
F	657.9	38	963	329.0	1292.0	1849	177.3	150					
G	500.6	36	687.5	250.0	937.5	1320	126.6	130	132.0	137.6	717.0	104.2	76.5
H	503.9	29	530.5	252.0	782.5	101.8	97.8	120	123.0	128.2	668.5	126.0	85.5
I	641.7	36	882	321.0	1203.0	1693	162.4	150	180.0	187.6	978.0	111.0	81.3
J	681.1	33	842	340.5	1182.5	1616	155.0	150	155.0	161.5	842.0	100.0	71.2
K	641.7	32	763	321.0	1084.0	1465	140.6	150	158.0	164.6	856.5	113.4	79.0
L	653.0	36	897	326.5	1223.5	1722	165.2	150	150.0	156.3	815.0	91.0	66.6
M	576.2	48	1110	288.0	1398.0	2130	204.3	200	215.6	224.7	1170.0	105.4	83.7
N	585.1	37	831	292.5	1123.5	1595	153.0	250	250.0	260.5	1357.0	163.3	120.6
O	776.5	37	1102	388.0	1490.0	211.3	202.8	300	300.0	312.5	1627.0	147.6	109.1
P	599.5	48	1154	300.0	1454.0	2213	212.2	200	220.0	229.0	1193.0	103.4	82.1

Table LXVIII

Comparison of Open-Hearth Productivity Per 1000 Cubic Feet of Bath Volume

Furnace	Tons tapped per hour, Table LXIV	Bath Volume, cubic feet Table LXVII	Cubic feet per ton steel	Tons per 1000 cubic feet per hour	Cubic feet per ton per hour
A	13.0	815.0	5.21	15.96	62.0
B	9.93	651.0	5.21	15.25	65.5
C	12.74	597.5	5.21	21.30	46.9
D	9.16	618.2	5.21	14.82	67.5
E	11.47	836.5	5.21	13.73	72.8
G	12.05	717.0	5.21	16.81	59.5
H	10.42	668.5	5.21	15.59	64.1
I	17.05	978.0	5.21	17.43	56.8
J	13.27	842.0	5.21	15.77	63.5
K	13.72	856.0	5.21	16.04	62.5
L	13.32	815.0	5.21	16.35	61.2
M	13.30	1170.0	5.21	11.37	87.3
N	16.70	1357.0	5.21	12.31	81.2
O	18.97	1627.0	5.21	11.67	85.7
P	13.43	1193.0	5.21	11.25	88.8

a measure of the speed of operation as well as the quality of the combustion practice and all other factors that enter into the making of steel in an open-hearth furnace excepting labor and maintenance.

Applied to furnace A, now rated as 150 tons, the complete term would be expressed as 110-155-62, the first number, 110, representing the calculated correct capacity, 155 the tonnage actually tapped, and 62 the number of cubic feet of bath required to make 1 ton of steel in 1 hour.

A three-figure term perhaps will be criticised as cumbersome. Even so, a truly descriptive term is infinitely better than a numerical term, presumed as an accurate indication of measurement, which fails utterly in that function. Far better than the present accepted method would be simply to call the furnaces small, medium or large, if a term that is without much meaning is acceptable to the industry

Were the furnaces under description newly rated in accordance with this discussion, they would be as in Table LXIX. Unfortunately, the data offered in connection with furnace C cannot be authenticated. Otherwise, a hypothesis could be constructed along the line that if decided advancement is to be made in steelmaking practice, many of the now accepted features of design, including conventional combustion practice, must be discarded; and, a totally different concept of the requirements of the practice developed with radical changes of furnace design and operating technique.

Improvements Will Be Made

So long as existing design and operating methods are the criteria upon which the process as a whole is judged, improvements in the process will continue until the ultimate, whatever that may be, is reached. They will be brought about through a painstaking study and understanding of the numerous details as applied to construction, combustion and melting and operations practice, and the application of coordinated detailed improvement to be made from time to time as may be the least costly and most convenient. In other words, improvements in design and operation of existing units should be undertaken only as a part of a comprehensive schedule of betterment developed to overcome all of the weaknesses of a furnace in time.

The attempt to improve practice by the installation of a new combustion system, or the application of insulation to a segregated part of the furnace may prove to be and often are found worthless through the inability of parts of the furnace to react properly when the so-called improvement is made.

Alterations designed as improvements never should be undertaken without first examining a flow diagram of the system for its weaknesses, nor without a thorough knowledge and understanding of the properties of new or novel materials or equipments which are anticipated for use, or without a well considered and co-ordinated schedule of all desirable improvements to include the cost of each individual item of improvement and its financial return if and when made. Casual and unrelated improvements are seldom such and often discredit the operating man as well as reacting unfavorably against equipment or materials, that in themselves would be found entirely satisfactory if correctly applied at the proper times or when the furnace was in shape to receive them.

Table LXIX

Proposed Rerating of Open-Hearth Furnaces

Furnace	Present arbitrary rating, tons,	Proposed descriptive rating, tons
A	150	110—155—62
B	100	110—125—65½
C	100	110—115—47
D	100	120—120—67½
E	125	115—160—73
F	150	185—.....—....
G	130	130—140—59½
H	120	100—130—64
I	150	170—190—57
J	150	160—160—63½
K	150	145—165—62½
L	150	170—155—61
M	200	215—225—87½
N	250	160—260—81
O	300	210—310—85½
P	200	200—230—89

Conclusions regarding design and operation as developed in this chapter include many important facts. Roof contours actually show but minor difference of design. Examination of the ends indicates two or possibly three rather dimly defined types of slopes to the knuckle, the type depending on the class of fuel used. But other than the ends, the roof contours differ but little. When fuels enter the furnace throat under little head an end slope of the roof is at least desirable, but where the fuel used is driven and enters the furnace throat under considerable head, roof end slopes are unnecessary.

Monkey walls and roof knuckles find their greatest development in producer-fired furnaces. They are almost totally absent in several of the fixed fuel furnaces Their least necessary development is desirable from the economic viewpoint.

Other items being equal the greater the distance from the termination of the fuel inlet port to the end of the bath, the better the fuel results.

Certain sectional areas through the furnace and ports are highly critical to operating and economic results. Maximum possible areas at A_1 A_2 and A_3 require especial attention in their design.

Over long periods of operating time, fuel results in different plants and furnaces vary to a much smaller degree than generally is supposed.

The volumes of furnace gases developed from the combustion of equal calorific values of the different fuels vary considerably. As velocity within the furnace system is to a major degree responsible for overall furnace operating cost or economy, it is important that the different effects be recognized in design.

A comparatively small increase in velocity may create pressure changes that severely will modify furnace operation. A thorough understanding of the relations of pressure and velocity as existing in the system are essential to any study of open-hearth furnace operation or design.

The flow diagram, which is here introduced for the first time, is a basic necessity and requirement for advanced and thorough study of the open-hearth furnace and its operation. Through its use the hidden ailments of any poorly working furnace may be located definitely and the remedy accurately prescribed.

Flow Diagram Important

Any decided improvement in basic design or operation must be premised from the development of an appropriate flow diagram permitting accurate analyses of gas flow conditions in any furnace component.

A much greater reduction of present ingot cost will come through an increase of productivity of a given unit rather than any possible fuel saving although fuel saving will follow any increase of productivity.

Transfer of heat from a flowing stream of combustion gases into a mass of metal, solid or molten comprising the charge and its transposition into steel of desired analyses, is the major function of the open-hearth furnace. Incidental processes such as preheating the air are totally extraneous to the principal process. Air, heated by any other means, equally would be effective. In the desire for economy incidental components of the furnace system generally have been given study and attention to the exclusion of the thought that improvements to create economies should begin at the heart of the process. The furnace proper has been neglected.

Heat transfer rate is a function of heat, temperature difference, velocity and time. Heat input and temperature difference are controlled in all open-hearth operations.

By any method of reasoning there must be a gas velocity that will produce the maximum heat transfer to any furnace charge. The proper velocity to secure maximum results being determined in any furnace, a method is offered by which equivalent results can be secured in any other furnace. A well organized campaign to determine the proper velocity value is of utmost economic importance to this practice.

The point is made rather decisively that furnaces with deeper baths are producing a greater tonnage of steel at less overall cost.

The present common practice of arbitrarily rating furnaces on their probable holding capacity of molten steel is faulty in that such a term contains no indication of operation or productivity.

If any numerical designation is to be used as descriptively signifying the capability of a unit, it should be a comprehensive and accurate term. The use of a compound term such as a "110-155-62 open-hearth furnace" which includes concrete data as to design and operation should be adopted.

(To Be Continued)

Coke Plant Sells Its Surplus Gas to Public Utility

SURPLUS coke oven gas made in the by-product coke plant of the Columbia Steel Co., subsidiary of the United States Steel Corp., Provo, Utah, is sold for commercial use and is piped from the company's plant in Ironton, near Provo, to a line entering Provo after having passed through Salt Lake City.

Under this arrangement, the load which the compressors are required to handle varies more or less in accordance with the demand on the pipe line in Salt Lake City and probably a considerable amount of the gas used in Provo is that delivered from the Columbia Steel company's plant.

Two 18 x 18 and 19 x 19 x 20-inch single-stage gas-engine driven compressors, built by the Ingersoll-Rand Co., New York, comprise the pumping equipment, and they are designed for handling coke oven gas from atmospheric intake to discharge pressures ranging from 20 to 70 pounds per square inch gage. These machines, shown in the accompanying illustration, are equipped with control stands which contain the air starting, fuel and water valves, all located at one central point.

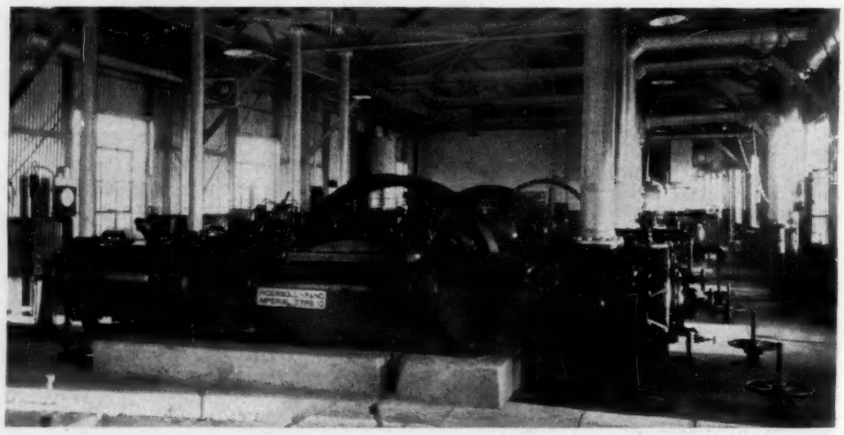
Control Is Flexible

The outstanding feature of this installation is the flexibility of control of regulation which is obtained. Each machine is equipped with an automatic speed and pressure governor and step unloader by which the load on the machine and the capacity of gas delivered is regulated in direct accordance with the demand. Due to seasonal variations in gas consumption, the pressure required at the pipe line intake varies as stated from 20 to 70 pounds per square inch and due to demand fluctuations along the pipe line the compressors may be called upon to deliver from full to no load capacity over short periods of time.

When the demand for gas decreases, the pressure in the pipe line builds up. When this pressure reaches the predetermined limit, the automatic speed and pressure governor comes into play and slows the machine down to as much as one-half speed, if necessary, to balance the quantity of gas delivered with consumption. If the consumption still decreases, the pressure continues to build up, and if the machine has already dropped down to one-half speed, the step unloader further decreases the load and capacity delivered, in five equal steps, until the machine is running at no load and one-half speed.

When demand increases, the opposite procedure takes place until the machines are operating at full load and full speed. The predetermined limit to which the machines usually compress the gas is regulated by adjustments on the compressor control apparatus.

Additional equipment which the Ingersoll-Rand company supplied for this installation included three motor pumps used to circulate cooling water through the compressor and engine cooling jackets and through the heat exchangers; and two motor-driven air starting units for the gas engines.



Two gas-engine driven compressors installed in a Utah by-product coke plant to supply surplus gas directly to public utility pipe line. Because gas demand varies considerably, flexible and automatic regulation of the compressors is necessary

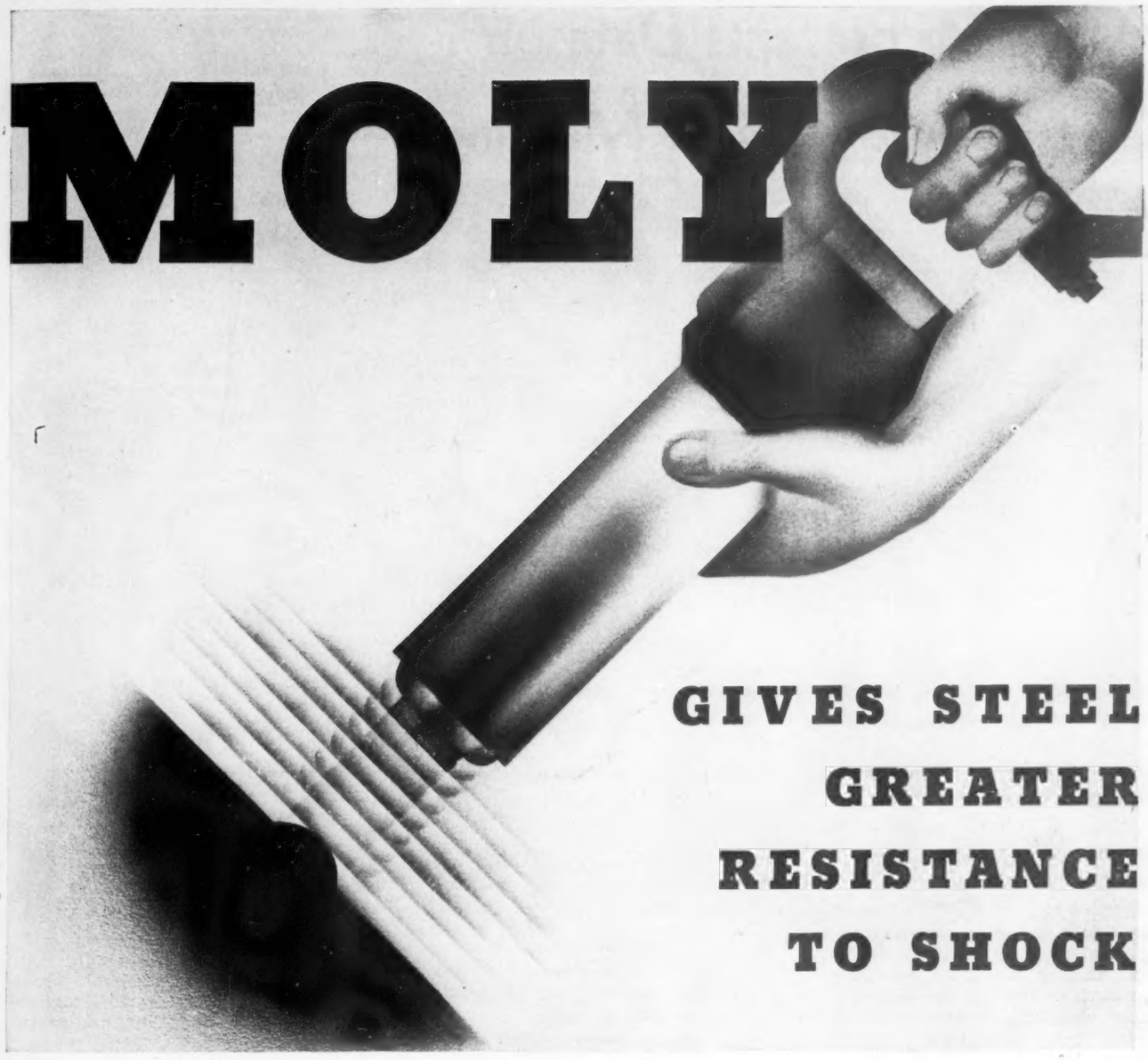
Reaffirms Forged Tool Simplified Practice

Simplified practice recommendation R17-31, covering forged tools has been reaffirmed, without change, by the standing committee of the industry, according to an announcement by the division of simplified practice of the United States bureau of standards, Washington.

This recommendation, which was proposed and developed by the industry, is concerned with industrial forged tools, and railroad track tools. Eye numbers for these tools have been incorporated in the list and are indicated opposite each item where it is part of the tool in question. Standard lengths, where applicable, are also included in the recommendation.

Alloy Steel in Coal Screens

Use of 12 per cent chromium steel in coal screens is discussed in a 12-page booklet recently issued by the American Sheet & Tin Plate Co., Frick building, Pittsburgh. Installation of USS 12 chromium steel in such screens is claimed to have given as much as 927 breaker operating hours, several times the service ordinarily obtained from other materials. Cost of the alloy steel, of course, is higher than that of other materials.



WHERE plain carbon steel is not quite good enough and a highly alloyed steel is economically prohibitive, Molybdenum will greatly increase the strength of carbon steel (maintaining that increased strength at high temperatures) and give greater ductility and resistance to impact. Moly is the most economical alloy you can add to an existing alloy steel when additional qualities are required. In many steels the addition of Moly, with an increase in the manganese and other low-cost alloys, permits a material reduction in the expensive alloys.

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A.S.T.M. Presents Data on Cast Iron at Annual Meeting

CAST iron absorbed the major share of attention at the initial technical sessions of the American Society for Testing Materials, conducting its thirty-sixth annual meeting at the Stevens hotel, Chicago, last week, June 26-30. Departing from customary procedure of devoting the first day to committee meetings, the society proceeded at once with its sectional sessions.

The opening session on Monday morning, a symposium on cast iron, was sponsored jointly by the society and the American Foundrymen's association, which had held its annual convention at the same place the preceding week. This symposium was the third in a series arranged by the two societies. A second session on Monday afternoon also involved consideration of cast iron and the effect of temperature on metals.

In officially opening the meeting, Cloyd M. Chapman, consulting engineer, New York, president of the society, pointed briefly to the part the engineering profession has played in the progress of the past century, as emphasized at the Century of Progress exposition.

Select New Leaders

New officers, as listed elsewhere on this page, were announced at a general meeting on Monday evening and various committee reports were presented. Prof. T. R. Lawson, the new president, has been active in work of the society for many years, having served during the past year as vice president. A biographical sketch of Prof. Lawson appears on Page 19 of this issue of STEEL.

The annual address by Retiring President Chapman traced the various steps in industry which have resulted in the development of the society. C. L. Warwick, secretary-treasurer, in reporting for the executive committee pointed out that activities of the organization, particularly in regard to the number of standards which have been set up, have increased steadily over recent years despite the dropping off in membership since 1929, occasioned by business conditions.

The seventh award of the Charles B. Dudley medal was made to Samuel Epstein, metallurgist, Battelle Memorial institute, Columbus, O., for his paper on "Embrittlement of Hot-Galvanized Structural Steel," which was presented at the 1932 annual meeting. This award is made annually to the author or authors of a paper of outstanding merit constituting an original contribution on research in engineering materials. Established as a means of stimulating research in materials, it commemorates the name of the first president of the society.

Various parts of the cast iron symposium were discussed by members of the committee which has had charge of the preparation of the work, as follows: "Introduction and Definitions," by H. Bornstein, Deere & Co., Moline, Ill.; "Metallurgy of Cast Iron," by John W. Bolton, Lunkenheimer Co., Cincinnati; "Properties of Cast Iron" and "Machinability of Cast Iron," by James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.; "Corrosion Resistance and Heat Resistance of Cast Iron, "Welding," and "Recommended Design," by E. K. Smith, Electro Metallurgical Co., Chicago; "Classifications and Specifications," by W. H. Rother, Buffalo Foundry & Machine Co., Buffalo,; Heat Treatment of Cast Iron," by R. F. Harrington, Hunt-Spiller Mfg. Co., Boston; and "White and Chilled Iron," by R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee.

In general, cast iron is defined as an iron containing so much carbon or its equivalent that it is not malleable as cast. Following the brief section on definitions, the work takes up the history of cast iron and then discusses briefly the methods of manufacture and the field of applications. The third section on metallurgy discusses the various factors which influence the properties of gray cast iron, such as carbon, silicon, manganese, sulphur, phosphorus, nickel, chromium, molybdenum, vanadium, copper, titanium, aluminum and zirconium.

Section four on the physical properties of cast iron indicates that the metal is used widely in engineering and allied industries because of the ease with which it may be cast, its low cost, and the wide range of physical properties. The report discusses in considerable detail data on tensile strength, compressive strength, transverse strength and deflection, elastic properties, shear strength, fatigue or endurance limit, impact or shock resistance, hardness, wear resistance, machinability, corrosion resistance, mass effect, heat effect, etc. The capacity for damping is mentioned in the text, and during the discussion which followed the presentation of the paper, W. W. Kerlin, Gray Iron institute, Cleveland, pointed to that property as one of extreme importance to the designing engineer.

The A. S. T. M. tentative specification A48-32T is discussed in detail in the fifth section. Section six is devoted to heat treatment and provides discussions on annealing for three different purposes: To relieve internal stresses; to soften for machinability; and to anneal white or mottled irons as cast to obtain higher strength gray irons. Information also is given on quenching and drawing and nitriding. The seventh section on white and chilled irons discusses heat treatment, hardness, effect of alloys on chilled and white iron castings.

Welding Data Included

To combat the difficulty of the hard area around the weld on cast iron, information has been included on the subjects of fusion welding, bronze welding, and electric welding. The final section discusses certain factors of design which may provide the basis for savings in the cost of manufacture and greater utility in service.

In the discussion, W. B. Coleman, president, W. B. Coleman & Co., Philadelphia, presented a written comment on the use of vanadium and titanium in cast iron, especially touching on some of the work which has been done in Europe. John Shaw, Southsea, England, complimented the committee highly for the work accomplished. He mentioned that at last foundrymen in the United States have come to recognize that

New Officers

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Vice President

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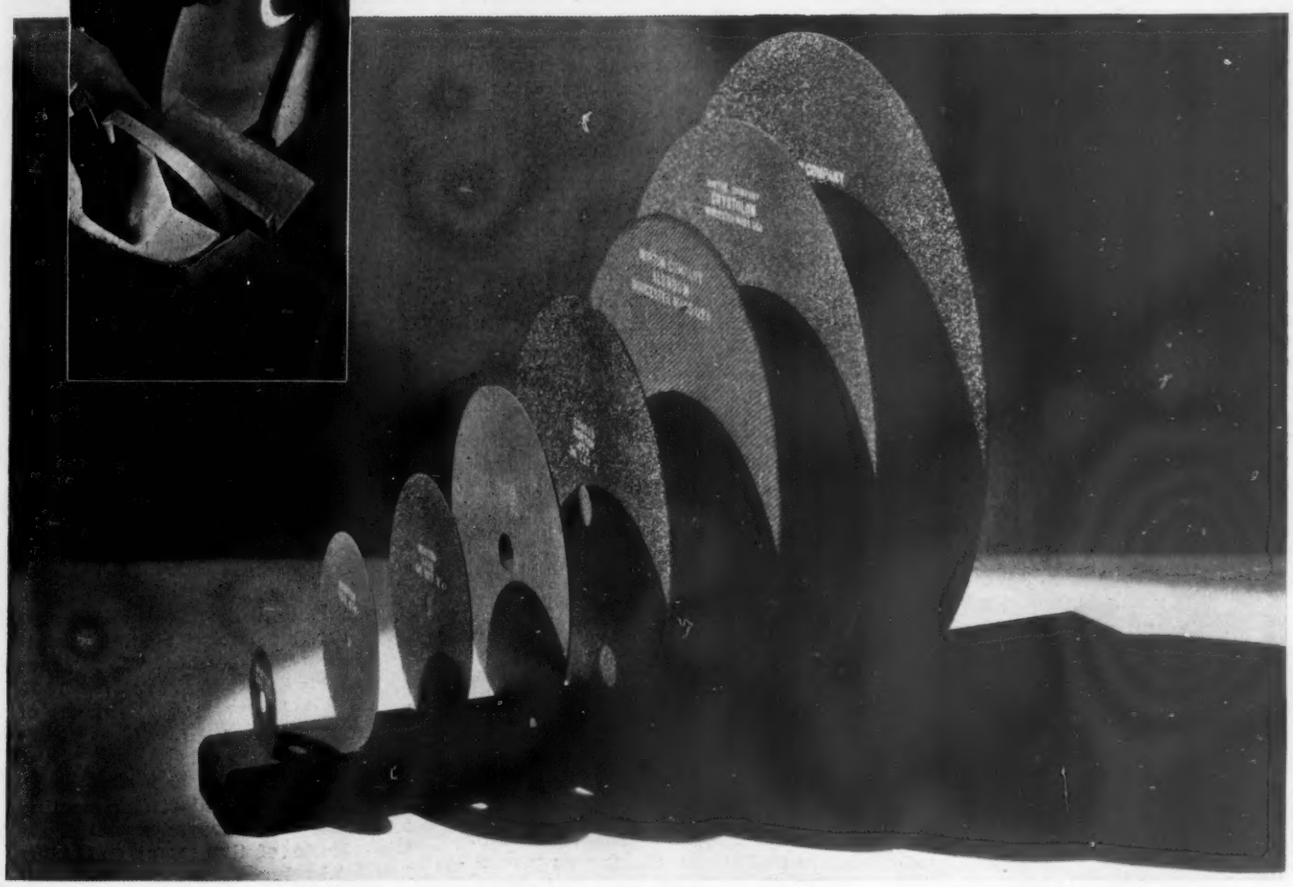

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the test bar must bear a relation to the cross section of the casting.

He also stated that he does not consider the tensile test a true indication of the value of cast iron and that he favors greater use of the transverse test. Also, engineers should get together to decide upon the type of hardness tests which are to be made so that a fair method of comparison will be available.

Further discussion brought out the fact that this symposium represents the most extensive and valuable collection of data on the subject ever attempted. Touching as it does, every phase of the subject, it should prove of especial value to engineers employing gray iron castings as engineering materials as well as the gray iron foundry industry as a whole. Written discussion on the work is invited so that all suggestions may be given proper consideration before the work is published.

The session on cast iron and effect of temperature on metals featured committee reports and papers. Committee A-7 on malleable iron castings recommended that the tentative revision of the standard specifications for malleable iron castings, A47-30, proposed last year in the form of a separate tentative specification entitled A47-32T be referred to a letter ballot of the society. This report was adopted.

Revisions Are Suggested

H. Bornstein, Deere & Co., Moline, Ill., as chairman of committee A-3 on cast iron, reported on the symposium on cast iron and the meeting on tests and specifications which were held as joint efforts with the American Foundrymen's Association. He reported that the committee had decided to hold the gray iron castings specification A48-32T as tentative for further investigation. A recommendation to withdraw specifications A48-29 and A88-31, since they conflict with the present tentative specification, was accepted and will be referred to the membership of the society.

A report of probably the most important investigation ever sponsored by committee A-3, covering impact testing of cast iron, was presented by James T. Mackenzie, American Cast Iron Pipe Co., Birmingham, Ala. This report contains a comprehensive series of data on physical properties of cast iron.

Report on Temperature Effect

Report of the joint research committee of the A. S. M. E. and A. S. T. M. on "Effect of Temperature on the Properties of Metals" was presented by H. J. French, International Nickel Co., New York, and chairman of the committee. H. F. Moore, University of Illinois, Urbana, Ill., presented an abstract of the three appendices to the report. The meeting then voted to submit to letter ballot the proposed tentative method of test for long time (creep) high-temperature tension tests of metallic materials and proposed tentative method of test for short time, high-temperature tension test of metallic materials.

Mr. MacKenzie presented an informal report of the sectional committee on specifications for cast iron pipe and special castings and stated the work has fair prospects of being completed on pit cast pipe by the end of the year. Papers presented at the meeting included "Creep and Structural Stability of Nickel-Chromium Iron Alloys at 1600 Degrees Fahr." by W. A. Tucker and S. E. Sinclair, bureau of mines, which was presented by H. S. Rawdon of that department, and "Studies on the Modification of the Rohn Test for Investigating Creep of Metals," by C. R. Austin and J. R. Gier, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Adopt New Standards for Steel and Wrought Iron; Propose Revisions

RECOMMENDATIONS of various committees concerned with the establishment of standards for steel and wrought iron were given at one of the sessions of the American Society for Testing Materials. New standards which were proposed and adopted as tentative measures cover specifications for heat-treated carbon steel elliptical springs for railway equipment; specifications for alloy steel castings for structural purposes; and specifications for lap welded and seamless steel pipe for high temperature service.

Revisions were recommended for 11 standard specifications covering rolled, cast and forged steel products, including, among others, structural steel for bridges and buildings, boiler and firebox steel, cold-finished bars and shafting and cast valves, flanges and fittings. Nine standards, recently listed as tentative, were approved to be adopted as standard, while 13 tentative revisions of existing standards which were proposed last year were accepted as standard revisions.

A year ago it was proposed to refer to the bessemer process as the "acid-bessemer process" and it was recommended that this tentative revision be adopted as standard. The subcommittee on steel reinforcement bars proposed a reduction from 5 per cent to 3.5 per cent in weight tolerances, which recommendation was approved at the meeting. Among other measures approved was the proposal to withdraw standard specifications for cold-rolled steel axles and for lap welded and seamless steel pipe for high-temperature service.

The report of the committee on wrought iron proposed tentative standards for wrought iron rivets as well as the revision of several existing specifications and the advancement of tentative standards covering iron bars and terms relating to wrought iron to standard.

A proposed tentative standard for wrought iron and wrought steel pipe is under consideration by the committee on this subject for the purpose of meeting present widely different and increasingly severe service conditions which were not visualized when the existing standard dimensions were originally published in 1886. The proposed standard covers the entire field of piping work for wrought iron and wrought steel pipe from the lowest pressure requiring the use of thin-walled pipe in the larger sizes of pipe sufficiently heavy for the highest pressure standard now in use, that for 1500 pounds; and manufactured by any of existing processes.

Structural Steel Tested

A paper presented at this meeting on "Shearing Properties and Poisson's Ratio of Structural and Alloy Steels" by Inge Lyse and H. J. Godfrey, Lehigh university, Bethlehem, Pa., described results of tests to determine shearing values and their relation to the corresponding tensile properties. These tests gave considerable variation in the ratio of yield point in shear to yield point in tension for different steels. Shearing modulus of elasticity determined by direct measurement agreed reasonably well with values calculated from values of tension modulus and Poisson's ratio.

A reliable method of determining impact resistance on very hard materials such as hardened tool steel is greatly needed, it was pointed out in a paper on "The Torsion Impact Test," by G. V. Luerssen and O. V. Greene, metallurgical department, Carpenter Steel Co., Reading, Pa. A machine and method especially adapted to hard materials, in which the specimen is fractured torsionally under impact, were described in detail. Test data were shown on three hardened tool steels drawn over a range of hardness. It was the authors' opinion that the torsion impact method operates with an accuracy and ease commensurate with standardized models used on softer materials.

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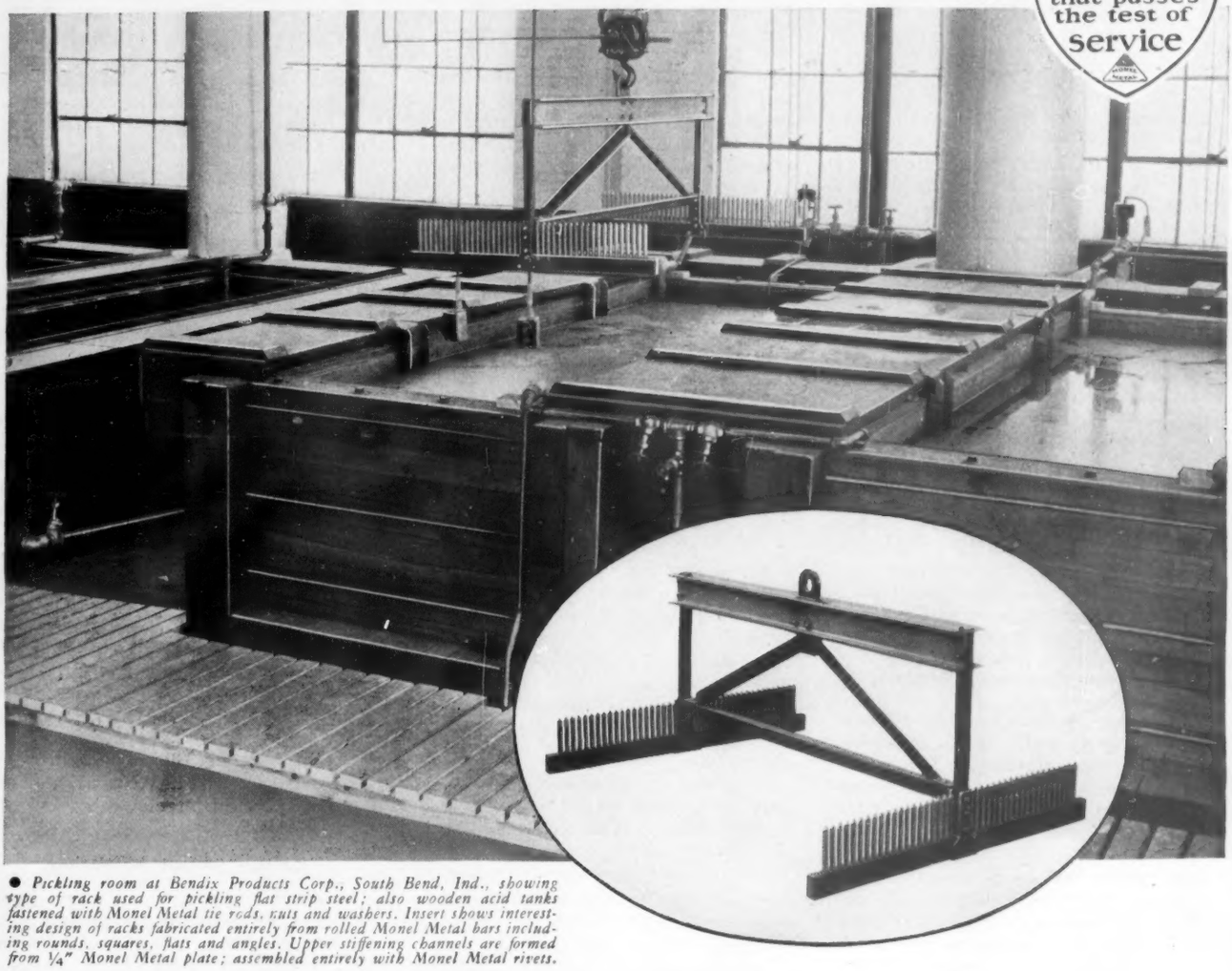

● *Pickling room at Bendix Products Corp., South Bend, Ind., showing type of rack used for pickling flat strip steel; also wooden acid tanks fastened with Monel Metal tie rods, nuts and washers. Insert shows interesting design of racks fabricated entirely from rolled Monel Metal bars including rounds, squares, flats and angles. Upper stiffening channels are formed from ¼" Monel Metal plate; assembled entirely with Monel Metal rivets.*

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Metal Cutting Discussed by Machine Shop Division

PROBLEMS involved in metal cutting, X-ray inspection of welds and use of gray cast iron as a material for machine construction were subjects holding the attention of members of the machine shop practice division of the American Society of Mechanical engineers which held its semiannual meeting at the Palmer House, Chicago, last week, June 26-29. The session dealing with gray iron and foundry practice was arranged jointly by the A. S. M. E. and the American Foundrymen's association.

Papers on milling and on cemented carbide cutting tools were presented at the opening machine shop practice session on Monday morning. In the paper, "Elements of Milling, Part 2," Prof. O. W. Boston and C. E. Kraus, University of Michigan, Ann Arbor, Mich. gave results of a series of experiments with a single-point end-cutting tool corresponding to a single tooth of a milling cutter when used in removing metal in a milling dynamometer of the pendulum type.

Materials Respond Differently

Values of energy as a function of variable feed, depth, width and front and side rake angles of the cutter were determined on the dynamometer when cutting a free-cutting brass and three steels, S. A. E. 1112, 1020 and 3250, cutting up and down in a groove and on a prepared land. Among other conclusons, it was found that various materials respond differently to the same change in front-rake angle of the tool as far as energy is concerned and that each material seems to give rise to its own characteristic constants and exponents. The formula for energy determination, while accurate enough for practical purposes, is not strictly correct, it was stated. The exponents themselves are a function of the variables feed and depth.

Proper designs of cemented carbide cutting tools were discussed in a paper by Malcolm F. Judkins, chief engineer, Firthite division, and William C. Uecker, engineering department, Firth-Sterling Steel Co., McKeesport, Pa. Causes of failure of such tools in the machining of softer steels and means of preventing their occurrence were described. A table was presented summarizing the clearance, rake angles, cutting fluids and cutting conditions which have been found to give consistently good performance and adequate tool life. It was stated that relatively large differences in depth of cut produce only small decrements in tool life but that rather small differences in feed per revolution produce relatively large decrements in tool life at corresponding cutting speeds. It is evident that cuts as deep as practicable and only moderate feed rates should be employed.

Progress in X-ray inspection of welds and the theory of metal cutting were considered at a second session of the machine shop practice division Monday afternoon. A paper on X-ray practice was presented by Herbert R. Isenburger, secretary, St. John X-Ray Service Corp., New York, and another on recent investigations in theory of metal cutting by Friedrich Schwerd, professor, Technischen Hochschule, Lehrstuhl fur Werkzeugmaschinen und Fabrikbetrieb, Hanover, Germany.

Mr. Isenburger's paper, discussing weld inspection, describing a new type of portable X-ray equipment and a new X-ray paper to be used in place of more expensive film, and setting up detailed tabulations on cost of inspection using three sizes of apparatus, was presented in full in the June 5 issue of STEEL.

The German paper on metal cutting described an investigation in which many instantaneous and moving pictures were taken of a cutting tool in operation to study: 1. The displacement of the individual particles of the material, that is, the vector field of the chip flow; 2. the temperature field; and 3. the changes in density of the material, that is, the field of hardening must be determined for the entire area which remains permanently deformed. Although the investigation has already led to the recognition of a series of fundamental facts, much more research remains to be done.

Gray iron specifications and electric furnace practice in the melting of gray iron were discussed at a machine shop-foundry session on Tuesday morning. A paper, "Development of Cast Iron for Machine Construction," was presented by Oliver Smalley and W. W. Kerlin, Gray Iron institute, Cleveland, and a second paper, "Notes on Electric Cast Iron Practice" by H. H. Walther, metallurgist, Dayton Steel Foundry Co., Dayton, O.

Castings Absorb Vibrations

The characteristic of gray iron castings with reference to damping was emphasized in the discussion by Mr. Kerlin. In answer to a question from the floor, he stated that the ability of the metal to absorb vibration decreases with a decrease in the size of the graphite particles, and that therefore a close-grained iron will not have as good damping properties as one of coarser grain section. John Shaw, Southsea, England, stressed the advantage of employing the transverse test rather than the tensile test as a true measure of the strength of gray cast iron.

Robert E. Kennedy, technical secretary, American Foundrymen's association, pointed to the present tentative specifications of the A. S. T. M. as providing a series of alloys. The value of the products available should be impressed upon the engineer, for it does not pay to develop high-strength irons unless the engineer understands the various factors which must be taken into consideration in using them. C. H. Morken, Detroit Electric Furnace Co.,

Many Attend Engineers' Day Program at Fair

ENGINEERS' Day, June 28, at A Century of Progress, Chicago, marked the climax of a week which witnessed one of the most notable and largest gatherings of engineers in history. Members of various associations and societies which had been holding separate meetings during Engineers' Week joined in the observance of the event.

Principal among these organizations were the American Society for Testing Materials, American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Foundrymen's association, Society of Industrial Engineers and Porcelain Enamel institute.

Highlight of the morning program was the presentation of the Daniel Guggenheim medal, the year's award for the most notable achievement in aviation, to Juan de la Cierva, inventor of the autogiro. Before an audience of more than 2000 assembled in Soldiers Field stadium Don Cierva landed in a plane of his design to receive the award.

The engineering societies' banquet that evening at the Stevens hotel completed the day's program. Harry B. Gear, president, Western Society of Engineers, presided. Edward J. Mehren, president, Portland Cement association, Chicago, spoke on "Contribution of Engineering to Progress—A Review and Evaluation." "Science and Engineering" was the subject of an address by Dr. Karl T. Compton, president, Massachusetts Institute of Technology, Cambridge, Mass.

Detroit, stated that the electric furnace gives what may be considered a new engineering material which may be controlled carefully as to physical and chemical properties.

R. F. Harrington, Hunt-Spiller Mfg. Co., Boston, pointed out that the specifications were designed for the guidance of engineers in the selection of engineering materials and that the user should be taught to think of the foundry as capable of producing castings thoroughly reliable and sound.

Present Report of 3-Year Research Comparing Roll Neck Bearings

PROGRESS report No. 10 on roll neck bearings was reviewed at a meeting of the iron and steel division of the American Society of Mechanical Engineers, by Prof. W. Trinks, Carnegie Institute of Technology, Pittsburgh, and J. H. Hitchcock, Morgan Construction Co., Worcester, Mass., secretary of the iron and steel division.

This report was a summary of results obtained during the three-year program of investigation relating to the application of roller bearings to the roll necks of rolling mills. Various factors relating to forces produced during rolling were studied closely and data covering both hot and cold rolling of various metals were compiled. Effects of skin friction as well as resistance to compression were observed. It was stated that additional information has been obtained concerning skin friction since this paper was compiled. Skin friction exerts its greatest influence in the rolling of thin sections, having little effect upon thick sections.

Cost Advantage Stressed

A comparative study was made of operating costs for various types of bearings in three representative installations, these including roller, flood-lubricated sleeve, brass and babbitt, bakelite and lignum-vitae bearings. Roller and flood-lubricated sleeve bearings have, in most cases, a marked economic advantage over brass and babbitt or nonmetallic sliding bearings, it was reported. This advantage is attributed to the longer life of the former and to their small coefficient of friction. Total operating cost for nonmetallic bearings was shown to be somewhat less, in each installation investigated, than that for brass and babbitt bearings.

A method for the determination of inherent stresses in structural components by measuring deformations of drilled holes was described in a paper by Josef Mathar, Technical University, Aachen, Germany, and presented by Th. von Karman, California Institute of Technology, Pasadena, Calif. In this process a small hole is drilled in the test piece and resulting deformations in the immediate vicinity of the hole are measured. For known monaxial stress conditions, it is only necessary to measure the change in the distance between two diametrically opposite points. Stresses in the test piece can be determined from these changes in distance. This method also may be used for determining inherent stresses in castings, welded pieces, concrete and rocks.

Deep Drawing Sheet Steel Is Unaffected by Aging

A new grade of deep drawing sheet steel with physical properties of unusual importance to metal stamping industries, has been announced by Dr. Anson H. Hayes, director of research laboratories, American Rolling Mill Co., Middletown, O.

The new steel is claimed to have excellent ductility, great uniformity of physical properties, ductility not impaired by temper cold rolling, permanent freedom from stretcher straining in the tempered condition, and shows no change with lapse of time in respect to ductility, yield point, tensile strength and hardness.

Testing Apparatus, Engineering and Power Equipment Feature Exhibits

TWO engineering expositions were held in the Stevens hotel, Chicago, last week during the meeting of the American Society for Testing Materials, one being sponsored by the society and the other being the sixth Midwest Engineering and Power exposition. The former was the second exhibit of testing apparatus and equipment and included not only industrial displays but a demonstration by society committees, research institutions and other organizations of special apparatus and testing methods. Much of the equipment shown is used and specified in test methods of the society.

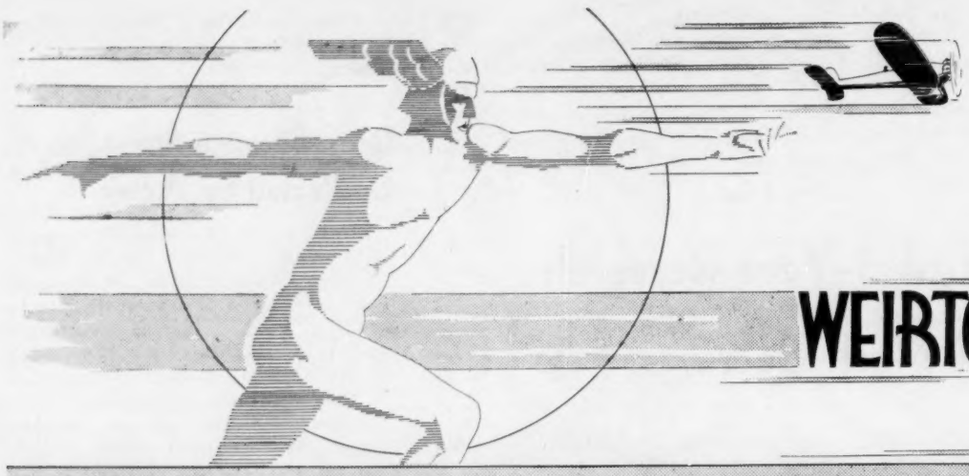
Newest Products Displayed

Among the companies displaying rather complete lines of their testing apparatus products were the Southwark division, Baldwin-Southwark Corp., Philadelphia; Christian Becker Inc., Chicago; Central Scientific Co., Chicago; Precision Scientific Co., Chicago; E. H. Sargent & Co., Chicago; C. J. Tagliabue Mfg. Co., Brooklyn; Westinghouse Research Laboratories, East Pittsburgh, Pa.; and the Wilson Mechanical Instrument Co. Inc., New York. Committee A-10 of the society on iron-chromium, iron-chromium-nickel and related alloys showed apparatus used for developing methods of corrosion testing, while several other committees also displayed equipment employed in their investigations.

More than 85 exhibitors were included in the Midwest Engineering and Power exposition. These displays incorporated a large variety of equipment used in power plant operations, such as valves, control apparatus, materials handling machinery, insulating products, water treatment devices, packing and traps. Ball bearing companies represented included the Aetna Ball Bearing Co., Chicago; Norma-Hoffmann Bearings Corp., Stamford, Conn.; D. B. Menton, Ottawa, Ill.; and S K F Industries Inc., New York. Osborn Mfg. Co., Cleveland, Barrett-Cravens Co., Chicago, Sauerman Bros., Chicago, and Yale & Towne Mfg. Co., Philadelphia, featured materials handling equipment. Wm. F. Klemp Co., Chicago, showed steel diamond grating and stair tread and surface armor.

Research on the Screen

The display of the International Nickel Co. Inc., New York, incorporated moving pictures illustrating the manner in which organized research is utilized in the solution of metallurgical problems and the development of new industrial materials. Republic Flow Meters Co., Chicago, demonstrated an advance line of industrial instruments with cartridge sealed elements, including some equipment shown for the first time. Graver Tank & Mfg. Co., East Chicago, Ind., displayed equipment for water treatment. Hagan Corp., Pittsburgh, sponsored a mechanical book describing the company's products.



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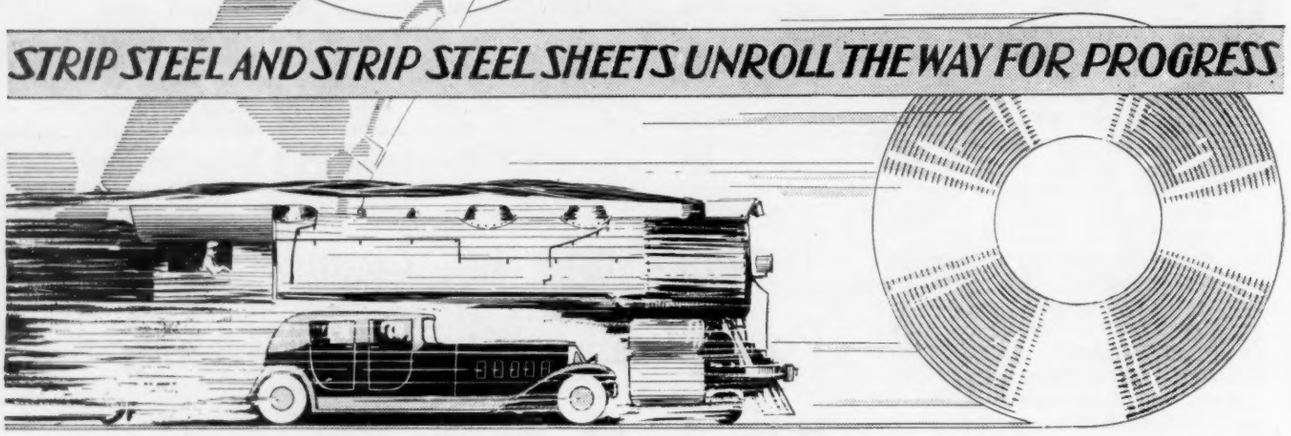

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Tin Mill Black Plate (All Finishes)
Lacquered and Coated Black Plate
Open Hearth Copper Bearing Terne
Plate 8 lb. to 40 lb. Coated
Hot and Cold Rolled Strip Steel
and
Strip Steel Sheets
High Finish Sheets
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(Common and Special Finishes)
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METHODS AND MATERIALS

PROPER selection of refractory material is of tremendous importance as a factor controlling the cost of maintenance of forging furnaces. A West Virginia manufacturer of oil well drills and equipment some time ago installed silicon carbide sidewalls in a forging furnace which operates at temperatures ranging from 2700 to 2800 degres Fahr. With this material, and with continuous operation, patching is required on the average of once a month and rebuilding on the average of once in three to four months. Formerly, with fireclay construction, the walls were patched daily and rebuilt entirely every two to three days.

$ $ $

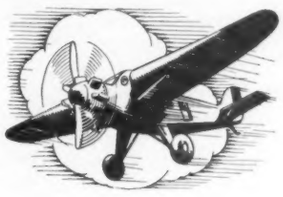
One temperature control device on the market operates from a helical thermostatic element placed directly in a chimney where the flue gases strike it. This element is supported by a monel metal rod and a steel tube which is cadmium plated. It would be difficult to imagine a more severe usage than is received by this tube, for flue gas temperatures may vary between rather wide limits and carry with them gases which cause rapid oxidation. Nevertheless, the cadmium plate provides adequate protection against corrosion.

$ $ $

METAL applied by oxyacetylene spray gun consists of extremely fine particles of metal traveling at a tremendous velocity. As these small particles strike the blast cleaned surface, they are driven into all the little crevices and irregularities of the base material and the mechanical bond obtained will run as high as 500 pounds per square inch. Subsequent heat treatment of the coating will run this bond to as high as 1600 pounds per square inch. Due to the high heat, the particles are very plastic as they strike, and flatten out upon the surface of the base material, forming a finely stratified structure. The arrangement of the tiny flattened particles may be likened to the arrangement of the scales of a fish—each little plate interlocking its neighbor and overlapping the one beneath, and the whole forming an armor plate which protects and preserves the material beneath.

$ $ $

A fleet of multimotored passenger airplanes being placed in service on New York-Chicago-Pacific Coast and other airways and to be operated on new schedules radically faster than heretofore are of all-metal construction with many component parts fabricated from steel. Because these planes must operate efficiently over the 2760-mile midcontinent airway from Atlantic to Pacific at elevations from sea level to 12,000 feet and temperatures varying from 40 degrees below zero to 120 degrees



above during the seasons, all exposed steel parts are protected against rust and corrosion by cadmium plating. The planes will carry ten passengers, crew of three and a large load of mail and express, and have a top speed of 182 miles per hour and a cruising speed of 165 miles. The manufacturer has long operated a cadmium plating department in connection with the building of military and commercial airplanes and has found the process invaluable in protecting its products against rust.

$ $ $

The statement is rather common that good industrial lighting can be obtained at an additional cost of about 2 per cent of the payroll. This average percentage has been determined from a great many actual cases in which improved lighting has been installed. Since the average cost of lighting in all industry today is equal to about 0.3 cent out of each dollar's worth of goods, obviously the existing standard could be doubled at about the equivalent of 2 per cent increase in payroll. Under present conditions, however, lighting has become a somewhat larger proportion of the budget than it was in days of high prices and large volume of business, for the cost of electric power could not be expected to keep pace with rapidly declining wage scales and materials costs.

$ $ $

When added to cast iron, molybdenum breaks up the large graphite flakes into small particles and refines the matrix. It also reduces the sponginess of cast iron, increases the yield point and the tensile strength up to 700 degrees Fahr. Resistance to abrasion also is increased.

$ $ $

WHEN it is necessary to use a lubricant in machining chrome-nickel stainless steel, it has been found that a mixture composed of 40 gallons of water, 10 gallons of lard oil, and 2½ pounds of 58 per cent soda ash works well. The tool upkeep on the ordinary machining operation very likely runs two to three times that in machining mild steel.

$ $ $

Rolls used in the production of stainless steel parts are being chrome plated. In some cases, it has been a life saver, as no other material would last long enough to make the operation feasible.

$ $ $

For decorative and rust resisting purposes, chromium plating practically always is superimposed on a layer of nickel, or copper and nickel. For this purpose the chromium layer usually is about 0.00005-inch thick. This extremely thin layer of chromium very markedly increases the resistance of the undercoatings to discoloration and to corrosion of the base metal, and enhances the appearance of the part plated.

$ $ $

A large manufacturer recently tipped the wearing surfaces of a milling machine bed with tungsten carbide. This material will resist wear for a much longer period than did the cast iron surfaces on the bed originally.

SCANNING THE FIELD OF TECHNOLOGY

A Digest of Important Developments Pertaining to the Production, Processing, Application and Performance of Steel

Stainless Tubing

Machinery, June, p. 638, 2 *pp.*, 3 *ills.*

Details of fabricating the tubular tie-rod on a popular make of automobile. The rod comprises a length of tubing of ordinary steel ⅛-inch thick with a covering of strip stainless steel 0.015-inch thick. The stainless steel strip is rolled so firmly on the plain steel, which is also rolled into tubular form, that the two metals, in effect, become one. The composite tubing is rolled in a special machine into which stainless and mild steel strip stocks are fed at one end, passing through several groups of forming rolls, and being cut to length and discharged at the other end at a rate of 15 tie-rods per minute.

—STEEL, 7-3-33

Forging Steel

By D. W. Murphy, in Transactions of the American Society for Steel Treating, June, p. 510, 22 *pp.*, 12 *ills.*, 5 *tables.*

Results of an investigation at forging temperatures of the effect of adding small amounts of sulphur dioxide and hydrogen sulphide to the products of combustion of city gas and air on the scaling losses, sulphur content and structure of the steel are presented. Of the various steels subjected to atmospheres containing sulphur dioxide, those containing nickel were found to be more adversely affected than either plain carbon or chromium steels.

—STEEL, 7-3-33

Die Castings

By Harold F. Shepherd and W. J. During, in Machine Design, June, p. 18, 4 *pp.*, 7 *ills.*

Part VII in a series dealing with design from the production standpoint. Features of die castings are considered in this installment.

—STEEL, 7-3-33

Decentralization

By A. F. Murray, a paper presented before meeting of the American Society of Mechanical Engineers in Chicago, June 29, *preprinted,* 15 *pp.*

An organization manufacturing diversified products involving variations in size, quantity and type of product, seasonal variations, style tendencies, special materials and processes and an endless procession of new developments is faced with many production problems. The solution of these problems usually requires decentralization both in separate manufacturing plants and in the departmentalization of the individual plants. How this works out in plants of Westinghouse Electric & Mfg. Co. is explained.

—STEEL, 7-3-33

Hardfacing

"How Hardfacing Saves Money for Contractors," published by Haynes Stellite Co., New York, 16 *pp.*, 21 *ills.*, 2 *tables.*

Description of increased life and savings effected through the application of hardfacing materials to the wearing parts of excavating and dredging equipment. Several types of hardfacing materials are discussed, including the nonferrous cobalt-chromium-tungsten alloys and welding rods consisting of particles of crushed tungsten carbide bonded together with steel.

—STEEL, 7-3-33

Welding

"Oxwelding for General Maintenance," published by the Linde Air Products Co., New York, 16 *pp.*, 19 *ills.*, 1 *table.*

This booklet describes the use of the oxyacetylene process of welding and cutting in reclamation of broken and worn machine parts, alteration, fabrication and installation of equipment, including piping, tanks and containers, machine elements, engine and pump parts, frames and conveying equipment.

—STEEL, 7-3-33

Railcars

Nickel Steel Topics, June, p. 1, 2 *pp.*, 2 *ills.*

Further information on the construction details of the Michelin stainless steel railcar recently built by Edward G. Budd Mfg. Co., Philadelphia.

—STEEL, 7-3-33

Manganese

Report of subcommittee on manganese of the committee on industrial preparedness of the American Institute of Mining and Metallurgical Engineers, 35 *pp.*, 5 *charts,* 1 *table.*

Manganese as an element in the problem of national defense. Second published report of the subcommittee on manganese. Uses of manganese, classification of ores, requirements, sources, foreign ores, domestic reserves, tariffs, etc., are some of the subjects discussed.

—STEEL, 7-3-33

Wire Cloth

"What Metallic Screen and Filter Cloth Offer Your Plant," published by the International Nickel Co. Inc., New York, 8 *pp.*, 28 *ills.*

How filtration problems have been solved in many different industries, tracing in detail some of the developments in the uses of wire cloth for filtration purposes, and charting definite economies which it has made possible.

—STEEL, 7-3-33

Power Production

By A. R. Smith, a paper presented at sectional meeting of the World Power conference in Stockholm, Sweden, June 26, *preprinted,* 16 *pp.*, 12 *ills.*

Co-ordinated production of industrial steam and utility power is discussed, as practiced by the General Electric Co., Schenectady, N. Y. Operation of the mercury vapor steam cycle is explained.

—STEEL, 7-3-33

Cutting Oils

By V. W. Wells, in Automotive Industries, June 17, *p.* 727, 1½ *pp.*, 2 *ills.*

Discussion advancing the opinion that wider use of water-mixed cutting oils, now used on only about one-third of the machining operations in a number of large plants, would reduce production costs.

—STEEL, 7-3-33

Permanent Molds

By Fred Erb and Edwin Bremer, in The Foundry, June, p. 38, 3½ *pp.*, 6 *ills.*

Application of the permanent or metal mold process to a variety of gray iron castings. The castings are made on circular molding machines, each machine comprising 12 molds.

—STEEL, 7-3-33

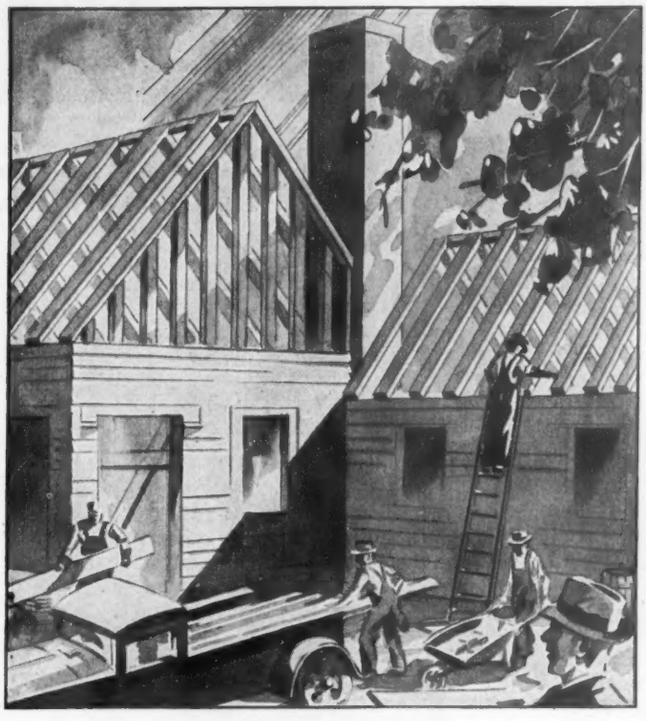
Welding Alloy Steel

Oxy-Acetylene Tips, June, p. 125, 5 *pp.*, 6 *ills.*

A survey of the correct procedure for welding chromium steels. Under proper conditions, and with correct procedure these high-chromium alloys can be welded successfully in practically all cases.

—STEEL, 7-3-33

NEW HOMES AND PUBLIC WORKS WILL TURN THE TIDE IN BUILDING



At the peak of the construction boom in 1928, building contract awards in 37 states totaled $6,600,000,000. In the first four months of 1933 the total was $202,000,000, an annual rate of $606,000,000.

A contraction so great as this indicates that the condition of over-building must be correcting itself. The country's population has not stopped increasing.

Actually, improvement in building is materializing. May contract awards showed a gain of 36 per cent over those for April.

Chief activity is found in residential building, for which the total in May was the largest since April, 1932, according to the F. W. Dodge Corporation.

Over and above this, the government is to undertake a huge public works program involving expenditures of over $3,000,000,000. Renewed construction activities will give momentum to those industries supplying building materials and equipment. Among the most important of these are the manufacturers of heating equipment and enamelware.

The plants of the Interlake Iron Corporation have for many years supplied pig iron and foundry coke to manufacturers of these products.

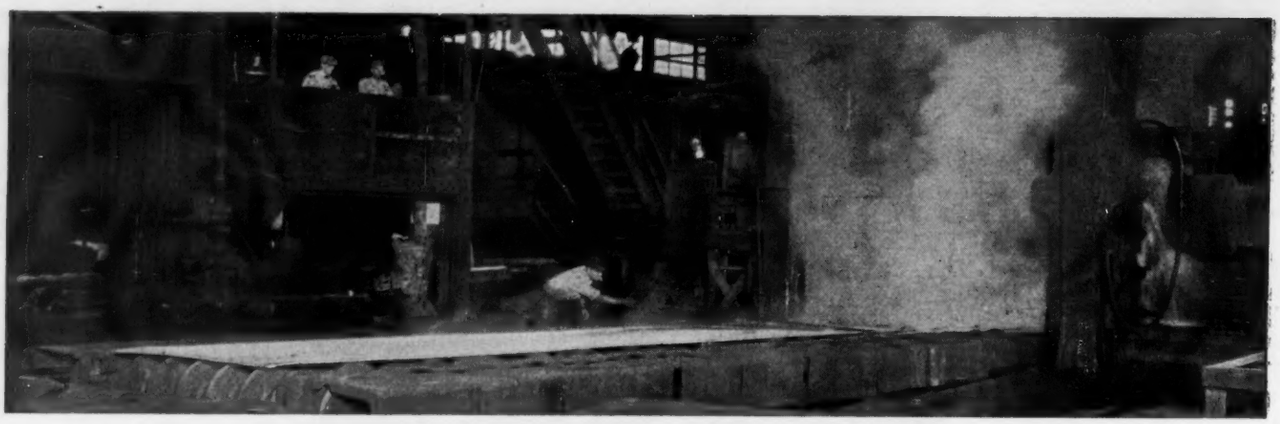
INTERLAKE IRON CORPORATION

PIG IRON - COKE

PLANTS—CHICAGO . DULUTH . TOLEDO . ERIE

PICKANDS, MATHER & COMPANY, Sales Agents

CLEVELAND . CHICAGO . DETROIT . ERIE . TOLEDO . MINNEAPOLIS . DULUTH

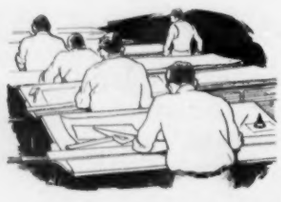


PROGRESS IN STEELMAKING

JOURNALS for supporting overhead crane bridges and trolleys, are best lubricated by packing them with a good grade of wool yarn waste which has been soaked with a specifically treated oil of high viscosity, according to a lubricating engineer. High-quality cold test makeup oil of about 2000 viscosity at 100 degrees Fahr. should be added through the medium of sight feed cups or wick feed. Oil drippage from the bearings will not occur if reasonable care is observed.

♦ ♦ ♦

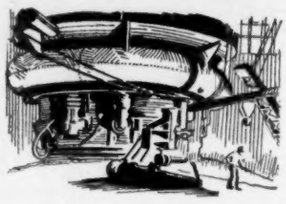
Maximum usage of cold strip mill rolls is obtained by a simple method employed at the plant of an Ohio producer. The rolls after grinding are installed in the housings of the last finishing mill where they have a life of approximately eight hours. By this time the surface has deteriorated somewhat and the roll is transferred to No. 2 stand of the train where its effective life approximates 18 hours. The roll finally is employed for roughing in stand No. 1, affording a campaign of 1½ days before regrinding is necessary.



TRUE perspective drawings can be made rapidly by the use of a recently developed machine which is built with a drawing mechanism mounted on a special drafting table. The visible portion of this mechanism consists of a cylinder and sliding straightedge, joined mechanically. The drafting board supports a sheet of specially ruled paper, the upper portion of which has a series of converging straight lines which intersect vertical lines ruled on the lower portion. The horizontal dividing line near the center of the paper represents the trace of the picture plane. Attached to the cylinder is a sheet of ruled paper with lines representing perspective heights.

♦ ♦ ♦

Eliminating all traces of rust, paint, oil and grease in one operation from the surface of iron and steel without harming the base metal is the purpose of a recently introduced liquid solvent.



ZINC in blast furnace burdens affects the operation by increasing the amount of coke required to smelt a ton of iron, leads to a scale formation on the lining, contaminates the metal and causes the refractories to disintegrate, according to tests conducted by German metallurgists. As the zinc vapor ascends the shaft, the pores in the ore and coke become blocked. The ore is rendered impermeable to the gases and its reduction is more difficult, thus leading to higher coke consumption. The surface of the iron is marked with holes and while its composition remains unchanged, its physical properties adversely are affected. The volatilized zinc, according to the tests on two stacks, penetrates the pores of the refractory lining, oxidizes and undergoes expansion in volume. The refractory becomes soft, penetration of carbon occurs, and the lining gradually crumbles. A high zinc value is associated with a high carbon value. The lower part of the shaft is not attacked to the same degree as the upper part inasmuch as the temperature is too high for the zinc to become deposited.

♦ ♦ ♦

Actual installations have proved the economy of using an insulating refractory in the lining of continuous heating furnaces for various type rolling mills, even though 50 shutdowns annually are involved.

♦ ♦ ♦

Preserving the high polish of strip mill rolls is accomplished by a simple procedure followed by the grinding department of an Ohio stripmaker. The roll, still on the machine when grinding is completed, is dried thoroughly, cleaned with whiting, and covered with heavy grease. A spiral strip of heavy paper then is wound around the surface of the roll. Previously canvas was used for protecting the polished surface but it was found that dust and grit collected in the weave of the cloth and imprinted the pattern of the cloth on the surface of the roll.

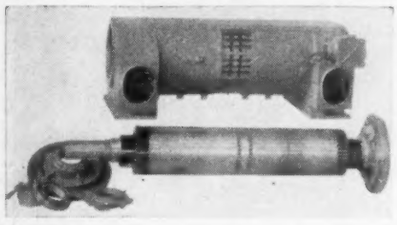
HEATS of basic open-hearth killed steel tapped from 10 to 15 minutes after being deoxidized with the recently adopted manganese-silicon alloy, are found to be much cleaner than if the steel is held in the furnace for a longer time. Where this procedure has been followed, few inclusions have been encountered and the percentage of iron oxide has been kept on the low side.

NEW EQUIPMENT

PRODUCTION FABRICATION TREATMENT FINISHING

New Type Motor Embodies Unique Construction

Louis Allis Co., 427 East Stewart street, Milwaukee, has perfected a unique motor which has 100 horsepower built into a unit less than 12 inches in diameter. This unusual type of motor, shown herewith, is



Unusual motor built by Louis Allis Co. typifies modern trend

said to be ideal for direct-mounted grinding wheels, saws, cutterheads, etc. The development of this motor illustrates how the proportions of a motor can be accommodated to limiting space requirements in many applications throughout industry.

◆

Cutting Tool Holder Can Be Adjusted for Length

Eclipse Counterbore Co., 410 St. Aubin avenue, Detroit, recently announced a new development in adjustable length holders for end cutting tools, reamers, taps, drills, etc. Principal features of the Microjustable length holder include instant micrometer adjustment for length (by hand), in conjunction with a constant positive lock in any position. Any changes in length from 0.001 to 1¼ inch is accomplished instantly by raising a knurled lock sleeve and turning the adjusting sleeve, then lowering the lock sleeve. Standard parts except the cutter sockets are used throughout. The socket only is changed when adapting the holder for use with different types of end cutting tool shanks.

◆

Supplements Line of Truing Tools with New Grade

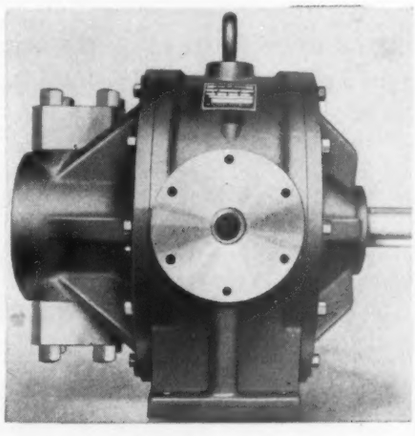
Carboloy Co. Inc., 2481 East Grand boulevard, Detroit, recently announced the development of a new grade of Carboloy truing tool for wheel dressing, designated 300, to supplement the two present grades of diamond-impregnated truing tools for finish dressing. With the addition of this new grade the line of truing tools now covers practically the entire range of finish dressing jobs. Each of the grades contains a specific type of diamond with grade 300 having the best quality stones to accommodate the more difficult dressing jobs.

Choice of mesh sizes considerably increases the range of work which can be done by any one particular grade and in many cases enables the user to apply successfully a lower priced grade than would be possible were only one mesh size available. Similarly, the three grades of stones now available offer opportunities for economies as the user may select the exact grade.

◆

Output of Radial Pumps Is Variable in Volume

Hydraulic Press Mfg. Co., Mt. Gilead, O., recently developed a complete line of radial pumps for generating pressure in operating hydraulic powered machinery. This series of pumps is of the positive displacement, multiple radial plunger, oil pressure type in which a number of new inventions are incorporated.



H. P. M. pump for heavy-duty machines requiring high pressures

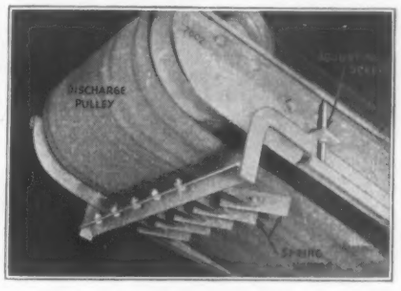
Output is both variable in volume and reversible in direction of flow, and the pumps are suited particularly for application to heavy-duty production machines requiring high pressures.

The pumps, shown herewith, are said to have high efficiencies, both mechanical and hydraulic, as well as smooth delivery, vibrationless operation, positive displacement through suction and delivery and a minimum of parts. Six sizes ranging from 1 gallon per minute to 100, with pressures capacities up to 3000 pounds per square inch are available.

◆

Thin Spring Steel Plates Provide Belt Wiper

Stephens-Adamson Mfg. Co., Aurora, Ill., recently developed a conveyor belt wiper, shown herewith. The device consists of a row of small

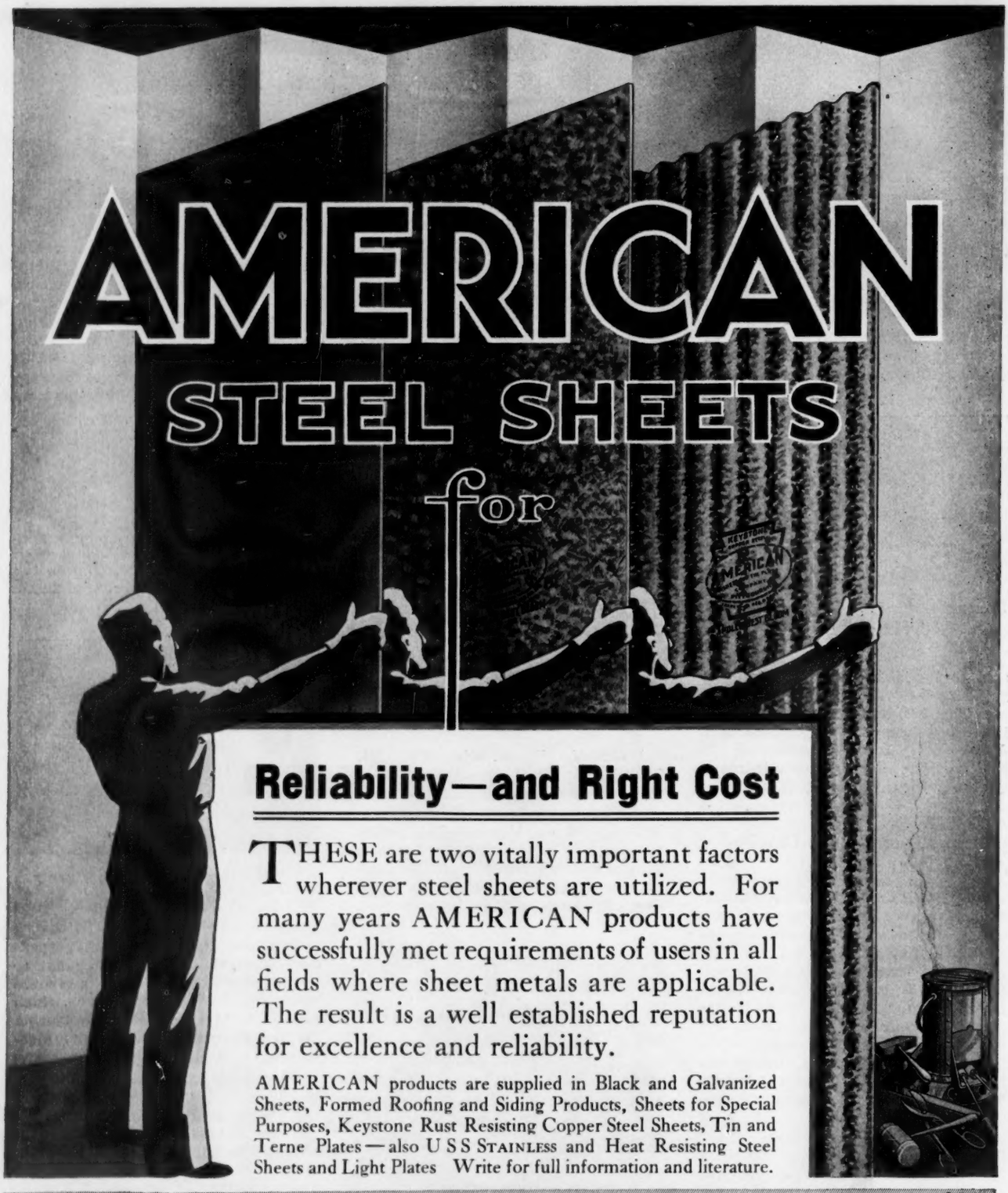


S-A belt wiper mounted on return run back of discharge pulley

thin spring steel plates, set perpendicular to the belt but diagonal to the belt travel. Each plate is pivoted upon an individual spring which presses it firmly against the belt. A pivoted connection allows the plate to seat perfectly.

Success of the device lies in the use of a stiff thin blade which will not bend and allow material to squeeze between the belt and the wiper. The wiper is mounted on the return run just back of the discharge pulley where material wiped from the belt falls into the discharge chute. It is reported to be entirely successful on every material tried, ranging from dripping wet to dusty dry. The cleaner operates satisfactorily on belts with all kinds of splices, including metal lacing as well as vulcanized joints.

In addition to the important feature of effectiveness, other advantages include simplicity, compactness, low first cost, no moving parts or special drives.



Reliability—and Right Cost

THESE are two vitally important factors wherever steel sheets are utilized. For many years AMERICAN products have successfully met requirements of users in all fields where sheet metals are applicable. The result is a well established reputation for excellence and reliability.

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GENERAL EXHIBITS BUILDING—A CENTURY OF PROGRESS EXPOSITION

Light 28 Stacks in June: Steel Rate Goes to 54

Plate, Shape and Bar Prices Extended as Sheets, Strip, Spikes and Ferromanganese Rise—Railroad Demand Improves—Heat Cuts Tin Plate Operations

TWENTY-eight blast furnace stacks were lighted in June—the greatest gain for any month since October, 1922—making 89 active and lifting the daily rate of pig iron production to 42,050 gross tons, according to the preliminary report for the month.

This daily average was the highest since July, 1931, and gave June a total of 1,261,600 tons, compared with 892,326 tons in May and 626,015 tons last June. In no month since August, 1931, has so much pig iron been produced.

Of this net gain of 28 in active stacks, making a total of 51 restored to service in the past three months, all but two were at steelworks, supporting the rapid improvement in steel ingot activity from 47 per cent in the first week of June to 54 per cent last week.

This rise of 3 points in the steel rate last week was largely due to the advance of 6 points in eastern Pennsylvania to 39½ per cent, 5 points at Pittsburgh to 46 per cent and 3 points at Chicago to 53 per cent. Cleveland also rose 3 points to 82 per cent, Wheeling 2 points to 86.

While Birmingham remained stationary at 50 per cent last week and Buffalo at 48, advances of 25 and 6 points respectively are scheduled for this week, insuring a further increase in the national steel rate this week, probably to above 55 per cent. New England steelworks, which slipped back 10 points last week, are expected to recover 12 points and go to 83 per cent.

Market reports for all districts and all products note expanding demand in most cases, occasionally a stationary condition, but nowhere a decline. Due to the expiration of second quarter contracts Friday, specifications were issued against practically every pound remaining, this alone assuring a brisk first half of July and upsetting the seasonal trend.

Price policies of manufacturers of the heavy finished products differ widely from makers of flat rolled products as the third quarter opens. Carnegie Steel Co. probably has set the pace for the former by opening its books for the third quarter on an unchanged basis from the second quarter.

Republic Steel Corp. took the lead in advancing cold-rolled strip $5 a ton over the second quarter to 2.25c, Pittsburgh-Cleveland, and 2.45c, Worcester, for the third quarter. Weirton Steel Co. has advanced hot-rolled strip $3 to $4 over second quarter level by announcing a base of 1.65c, Pittsburgh, for third quarter.

Last week sheet producers put so-called interim prices in effect, to apply against July specifications for shipment at mills' convenience by Aug. 15; in most sheet classifications this is an advance of $3. Railroad spikes are up $5 to 2.40c, Pittsburgh. By-product coke quotations have been increased 25 to 50 cents a ton. Ferromanganese has been advanced.

Requirements of the automotive industry appear to have reached their peak in June; July and August, while seasonally strong, may develop a slight easiness, for one reason because of a probable vacation by Ford next month.

Supplying an offset, railroad demands are slowly expanding. Tennessee Coal, Iron & Railroad Co., having booked 4100 tons of rails for the St. Louis & San Francisco, reopens its rail mill next week; Edgar Thomson rail mill of the Carnegie Steel Co. will resume shortly. The Algoma rail mill will roll 30,000 tons for the Canadian National.

Seaboard Air Line has placed 480,000 tie plates; Chesapeake & Ohio, 1000 tons of fastenings. Some eastern lines are quietly placing steel for equipment repairs. Pan-American Petroleum & Transport Co. has placed 7000 tons of plates with Chicago Bridge & Iron Works for a refinery project in Texas.

Higher prices on sheets and strip have lifted the iron and steel composite of STEEL 36 cents to $29.19 this week; the finished steel composite 80 cents to $46.30, while the steelworks scrap composite has moved up 9 cents to $9.79.

Composite Market Averages

	July 1	June 24	One Month Ago June, 1933	Three Months Ago April, 1933	One Year Ago July, 1932	Ten Years Ago July, 1923
Iron and Steel Composite	$29.19	$28.83	$28.73	$28.16	$29.47	$45.39
Finished Steel Composite	46.30	45.50	45.30	44.94	47.71	68.33
Steelworks Scrap Composite	9.79	9.70	9.55	7.23	6.06	16.45

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate pipe. Steelworks Scrap Composite:—Melting steel, compressed sheets.

COMPARATIVE PRICES OF IRON, STEEL AND COKE

Representative Market Figures for Current Week, Last Month, Three Months and One Year Ago

	July 1, 1933	June 1933	April 1933	July 1932
Pig Iron				
Besemer, del. Pittsburgh	$17.26	17.26	16.26	15.76
Basic, valley	15.00	15.00	14.00	14.00
Basic, eastern, del. eastern Pa.	16.19	16.19	14.19	14.25
No. 2 foundry, del. Pittsburgh	16.76	16.70	15.76	15.76
No. 2 foundry, Chicago	16.00	16.00	15.50	15.50
*Southern No. 2, Birmingham	12.00	12.00	11.40	11.00
**No. 2X, Virginia furnace	17.75	17.75	17.75	18.00
**No. 2X, Eastern, del. Phila.	16.76	16.76	14.51	14.76
Malleable, valley	15.50	15.50	14.50	14.50
Malleable, Chicago	16.00	16.00	15.50	15.50
Lake Superior charcoal, del. Chi.	23.04	23.04	23.04	23.04
Gray forge, del. Pittsburgh	16.63	16.63	15.63	15.63
Ferromanganese, del. Pittsburgh	73.24	73.24	73.24	73.24

*1.75-2.25 silicon. **2.25-2.75 silicon.

Delivered pig iron prices subject to 10 per cent freight surcharge, maximum 13.44c per gross ton, beginning Jan. 4, 1932.

Coke				
Connellsville, furnace, ovens	2.00	1.80	1.75	2.00
Connellsville, foundry, ovens	2.75	2.40	2.25	3.00
Semifinished Material				
Sheet bars, open-hearth, Youngs.	26.00	26.00	26.00	26.00
Sheet bars, open-hearth, Pitts.	26.00	26.00	26.00	26.00
Billets, open-hearth, Pittsburgh	26.00	26.00	26.00	26.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00

	July 1, 1933	June 1933	April 1933	July 1932
Finished Material				
Steel bars, Pittsburgh	1.60	1.60	1.60	1.60
Steel bars, Chicago	1.70	1.70	1.70	1.70
Steel bars, Philadelphia	1.91	1.91	1.91	1.91
Iron bars, Chicago	1.65	1.65	1.65	1.65
Shapes, Pittsburgh	1.60	1.60	1.60	1.60
Shapes, Philadelphia	1.65	1.65	1.65	1.75
Shapes, Chicago	1.70	1.70	1.70	1.70
Tank plates, Pittsburgh	1.60	1.55	1.55	1.60
Tank plates, Philadelphia	1.54½	1.49½	1.49½	1.79½
Tank plates, Chicago	1.70	1.70	1.70	1.70
Sheets, No. 10 blue anneal., Pitts.	1.80	1.65	1.55	1.70
Sheets, No. 24, hot ann., Pitts.	2.25	2.10	2.00	2.20
Sheets, No. 24, galvan., Pitts.	2.85	2.70	2.65	2.85
Sheets, No. 10 blue anneal., Chi.	1.95	1.80	1.70	1.85
Sheets, No. 24 hot ann., Chicago	2.40	2.25	2.15	2.35
Sheets, No. 24 galvan., Chicago	3.00	2.85	2.80	3.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Wire nails, Pittsburgh	1.85	1.85	1.85	1.95
Tin plate, per base box, Pitts.	4.25	4.25	4.25	4.75
Scrap				
Heavy melting steel, Pitts.	$11.75	11.65	9.90	8.35
Heavy melting steel, eastern Pa.	9.50	9.50	6.90	6.25
Heavy melting steel, Chicago	9.25	8.80	6.55	4.50
No. 1 wrought, eastern Pa.	10.25	10.25	7.35	6.25
No. 1 wrought, Chicago	8.10	8.10	5.50	4.60
Rails for rolling, Chicago	10.25	10.25	8.50	6.60

Sheets

Interim Prices Set at $3 Per Ton Over Second Quarter—Buyers Specify Heavily

SHEET PRICES, PAGE 51

Pittsburgh—Buyers specified fully against second quarter contracts before they expired last week, insuring present high operations at least through early July. What amounts to interim prices on sheets, to apply against July specifications for shipment for Aug. 15, have been adopted by practically all makers. The July price setup, which may be changed when a trade code is adopted for the industry, is 1.65c for hot rolled No. 10, 1.80c for hot rolled annealed No. 10, 2.25c for hot rolled annealed No. 24, 1.95c for cold rolled No. 10, 2.40c for cold rolled No. 20, 2.85c for galvanized No. 24, 2.50c for tin mill black No. 28, and 2.90c for long ternes.

Cleveland—Entering the third quarter with final action on the steel industrial code still to be taken and the result in terms of production costs undetermined, sheet mills are naming prices for new orders for July, shipments to be at mills' convenience up to Aug. 15. These interim prices generally are the top figures of the recent spreads, and in a number of instances represent an advance of $3 a ton over prices at which orders were booked earlier in June. No. 10 hot-rolled annealed now is 1.80c, base, Pittsburgh; No. 24 hot-rolled annealed, 2.25c; galvanized 2.85c. In the case of tin mill black, the new price is 2.50c, an advance of $4 a ton. Cold-rolled annealed and autobody sheets are unchanged. Heavy specifications on second quarter contracts will engage most mills beyond July 15. Mills here and in an adjacent lake district are scheduled for capacity in July.

Chicago—Sheet producers are quoting prices $3 a ton above the recent market for July business, shipment of which must be completed by Aug. 15. This makes the market 2.35c, base, for hot-rolled annealed sheets and 2.95c for galvanized.

Boston—Low bid by the only mill complying completely with specifications and delivery on 750 tons, No. 23 gage sheets, single pickled, 6½ x 90 inches for 1935 Massachusetts automobile license tags was Apollo Steel Co., Apollo, Pa., 3.22c net delivered, or 2.25c, Pittsburgh, figuring allowances. It was awarded the contract. Inquiry called for deliveries starting Nov. 1 to the state penitentiary, Charlestown, Boston.

New York—Sheet sellers are quoting tentatively the following for July specifications: Galvanized, 2.85c, Pittsburgh; black, 2.25c; and No. 10 hot rolled, 1.65c. Cold rolled sheets, No. 10 and No. 20 are 2.15c and 2.60c, Pittsburgh, respectively. These quotations are subject to revision should costs increase sharply under the proposed code. Apollo Steel Co. is low on most of 1030 tons of black and flat galvanized and corrugated galvanized sheets for navy yards.

Philadelphia—Sheet sellers are quoting July specifications at 2.85c, Pittsburgh, for galvanized, 2.25c for black and 1.65c for No. 10 hot rolled with No. 10 cold rolled at 2.15c, Pittsburgh and No. 20 at 2.60c. Generally speaking, these prices are about $3 a ton above last quarter.

Cincinnati—Despite a step-up in production to about 70 per cent, a leading sheet mill will require two or three weeks to make all deliveries on the rush of specifications to cover at prices current before July 1. It was believed the ordering represented heavier requirements although, of course, some business was to gain price advantage.

St. Louis—Spot buying of galvanized and hot-rolled annealed sheets is brisk, and specifications were heavy in the closing week of June.

Birmingham, Ala.—All sheet mills are active, shipments equal to output. Demand is increasing.

CURRENT FINISHED STEEL PRICES

Delivered prices subject to freight surcharge corrected to nearest ½c. Asterisk denotes price change this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

*Pittsburgh, base	1.65c
*Chi. dist. mills	1.75c
*Chicago, del.	1.80c
*New York, del.	2.00c
*Birm., base	1.80c
*Phila., del.	1.96c
St. Louis, del.	1.84c

HOT ROLLED ANN. No. 10

*Pittsburgh, base	1.80c
*Chi. dist. mills	1.90c
*Chicago, del.	1.95c
*Phila., del.	2.11c
*New York, del.	2.15c
St. Louis, del.	1.99c
*Birm., base	1.95c
San Fran., c.i.f.	2.12½c

HOT ROLLED ANNEALED No. 24

*Pittsburgh, base	2.25c
*Chi, dist. mills	2.35c
*Chicago, del.	2.40c
*New York, del.	2.60c
*Phila., del.	2.56c
*Birm., base	2.40c
St. Louis, del.	2.59c
San Fran., c.i.f.	2.75c

GALVANIZED No. 24

*Pittsburgh, base	2.85c
*Chi. dist. mills	2.95c
*Chicago, del.	3.00c
*Phila., del	3.16c
*New York, del.	3.20c
*Birm., base	3.00c
St. Louis, del.	3.19c
San Fran., c.i.f.	3.35c

TIN MILL BLACK No. 28

*Pittsburgh, base	2.50c
*Gary, base	2.60c
*St. Louis, del.	2.84c

MILL RUN COLD-ROLLED No. 10

Pittsburgh, base	1.95c
Chicago, del.	2.10c
Philadelphia, del.	2.26c
New York, del.	2.30c

No. 20

Pittsburgh, base	2.40c
Chicago, del.	2.55c
Philadelphia, del.	2.71c
New York, del.	2.75c

AUTO. AND FURNITURE

Pittsburgh, No. 10	2.15c
Pittsburgh, No. 20	2.60c

ENAMELING SHEETS

Pitts., No. 10	2.40c
Pitts., No. 20	2.90c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh

Tin plate, coke base, contract	$4.25
Do., stock	3.75
*Long ternes, No. 24 unassorted	2.90c

Gary base, 10 cents higher.

Corrosion, Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel sheets, 35c; plates, 31c; bars, 28c.

	A	B	C	D
Bars	19c	20.5c	23c	28c
Plates	21c	22.5c	25c	30c
Sheets	26c	27.5c	30c	35c
Hot Strip	19c	20.5c	23c	28c
Cold Strip	25c	26.5c	29c	34c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 18/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.60c
New York, del.	1.60c to 1.70c
Phila., del.	1.49½ to 1.59½
Boston, del.	1.72c to 1.82c
Buffalo, del.	1.85½c
Chicago, base	1.70c
Cleveland, del.	1.80½c
Birmingham, base	1.75c
Coatesville, base	1.40c to 1.50c
Pacific Coast, c.i.f.	1.75c
St. Louis, del.	1.94c

Structural Shapes

Pittsburgh, base	1.60c
Philadelphia, del.	1.65c to 1.75c
New York, del.	1.77c to 1.87c
Boston, del.	1.90½c to 2.00½c
Chicago, base	1.70c
Cleveland, del.	1.80½c
Lackawan., base	1.70c
Birmingham, base	1.75c
Pacific Coast, c.i.f.	2.10c
Do., wide flange	2.20c

Bars

SOFT STEEL

Pittsburgh, base	1.60c
Chicago, base	1.70c
Birmingham, base	1.75c
Lackawan., base	1.70c
Pacific Coast, c.i.f.	2.00c
Cleveland, base	1.65c
Philadelphia, del.	1.91c
New York, del.	1.95c
Boston, del.	2.02c
Pitts., cold finish	1.70c
Pitts., forg. qual.	1.75 and 1.85c
San Fran., c.i.f.	2.10c

RAIL STEEL

Pitts., Buff.	1.50c
Chicago, base	1.50c
Eastern mills	1.50c

IRON

Chicago, base	1.60c to 1.65c
New York, del.	1.85c to 1.90c
Philadelphia, del.	1.81c to 1.86c
Pitts., refined	2.70c to 4.20c

REINFORCING

New billet steel, Chi., Pitts., Buff., Cleve., Birm. (cut lengths)	1.75c
Chicago, rail steel	1.50c
Phila., cut lengths	1.86c

Wire Products

(Prices apply on carload lots. Mixed carloads 10 cents higher with 10% discount off extras; joint carloads 10 cents higher with no discount from extras; pool carloads 20 cents up; less carloads 30 cents up.)

F.o.b. mills, 100 lb. keg

Standard wire nails	$1.85
Cement coated nails	1.85
Galvanized nails	3.35

(Per pound)

Polished staples	2.55c
Galvanized fence staples	2.80c
Barbed wire, gal.	2.35c
Annealed fence wire	2.25c
Galvanized wire	2.60c
Woven wire fencing (base column, c.l.)	$50.00

(To Manufacturing Trade)

Plain wire, 6-9 ga	2.10c
Spring wire	3.10c

Anderson, Ind., $1 over Pitts.-Cleve.; Chicago, Duluth and Worcester, $2 higher; Fairfield, Ala., $3 higher.

Cold-Finished Bars

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	1.70c
20,000 to 59,999 lbs.	1.65c
60,000 to 99,999	1.60c
100,000 lbs. and over	1.57½c

Chicago, Cleveland, Buffalo 5c higher; Detroit, 20c; eastern Michigan 25c.

Shafting

Cumberland, Md., base

1⅛-inch	3.00c
1 7/16 to 1½-inch	2.50c
1 7/16 to 1⅞-inch	2.20c
2 1/16 to 6-inch	2.05c

Alloy Steel

Hot rolled, f.o.b. Pittsburgh, Buffalo, Chicago and Massollon, O. Base 2.45c to 2.65c. Differentials to various classes of consumers.

Alloy	Diff.	Alloy	Diff.
S.A.E.		S.A.E.	
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.30
2500	2.25	3400	3.20

4100 .15 to .25 Mo.	0.50
4600 .20 to .30 Mo. 1.25-1.75 Ni.	1.05
5100 .80-1.10 Cr.	0.45
5100 Cr. spring	0.20
6100 bars	1.20
6100 spring	0.95
Cr., Ni., Van.	1.50
Carbon van.	0.95
9250 (flats)	0.25
9250 (rds., sq.)	0.50

Strip, Hoops, Bands

*Hot-rolled strip up to 23 15/16-in. wide, Pitts.	1.65c
Do., Chicago	1.75c
Do., del. Phila.	2.06c
Do., del. N. Y.	2.10c
Cooperage hoop, Pittsburgh	1.65c
Do., Chicago	1.75c
*Cold-rolled strip Pitts,, Cleve.	2.25c
*Worcester, 3 tons or over	2.45c

Rails, Track Material

Stand. rails, mill	$40.00
Relaying rails, Pitts., 20-45 lbs.	$20.00 to 22.00
50 to 75	$16.00 to 18.00
80 to 100	$20.00 to 21.00
Light rails, 25-45, mills	$30.00
Light rails, Chi.	$32.00
Angle bars, mills	2.55c
Spikes, R. R. mills	2.40c
Spikes, boat, b'ge, Pitts.	2.65c
Track bolts, Chi.	3.50c
Do., stand. job.	73 off list
Tie plates, Pitts.	$35.00

Rivets, Wrought Washers

Tie plates, Chi.	$35.00
Struc. c.l., Pitts-Cleve.	2.50c
Struc., c.l., Chi.	2.60c
7/16-in. & smaller, Pitts., Chi., Cleve.	70, 10 and 5 off
Washers, c.l., Pitts. dist.	7.35 off
Do., Chi. dist.	7.25 to 7.00 off

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chi. Discounts to legitimate jobbing or large consuming trade for full-case lots, Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	73 off
Rolled thread, ½ x 6 and smaller	73 off
Eagle list	73 off

MACHINE BOLTS

All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts without nuts	73 off
*Tire bolts	60 off
Stove bolts, 72½-25-10 off in pkgs.; 85 off in bulk, 5000 or more of a size.	
Rolled thread machine bolts, ½ x 6 and smaller, 73 off.	

NUTS

Semifinished	73 off

HEXAGON CAP SCREWS

Milled	85 off
Upset 1-in. diam., smaller	85-10 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller	80 off
Upset, larger than 1-in.	80 off
Headless set screws	75-10 off

Cut Nails, Piling

*Cut nails, Pitts.; (10% discount on size extras)	$2.65
*Do., less carloads, 5 kegs or more; no discount on size extras	$2.90
*Do., less than 5 kegs; no discount on size extras	$3.05
Steel piling, Pitts.	1.90c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pittsburgh and Lorain, O., to consumers in carloads, Indiana Harbor, Ind., and Evanston, Ill., 2 points less. Chicago delivered, 2½ points less. Wrought pipe, Pittsburgh base.

All discounts are net.

BUTT WELD

In.	Steel Blk.	Steel Gal.
¼ and ⅜	60½	42
½	65½	54
¾	69	59
1—3	71	62
Iron		
½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD

	Steel	
2	66	57
2½ to 6	69½	60½
7 and 8	68	58
9 and 10	67	57
11 and 12	66	56
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½
9—12	38	24½

(*Please turn to next page*)

RAW MATERIAL PRICES

Delivered pig iron prices subject to 10 per cent freight surcharge, maximum 13.44c gross ton, from Jan. 4, 1932, except Buffalo del. at Boston. Asterisk denotes price change.

LINE PIPE

Steel

⅛-inch, butt weld	54
¼—⅜, butt weld	59½
½, butt weld	64½
¾, butt weld	68
1—3, butt weld	70
2-inch, lap weld	65
2½—6, lap weld	68½
7—8, lap weld	67
9—10, lap weld	66
11—12, lap weld	65

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe list. 8—12 inch no extra. 2-inch line discount unchanged from list prior to April 15, 1933.

BOILER TUBES

C. L. Discounts, f.o.b., Pitts.

Lap Welded Steel		*Charcoal Iron*	
2—2¼	38	1¾	8
2½—2¾	46	2—2¼	13
3	52	2½—2¾	16
3¼—3¾	54	3	17
4	57	3¾—3½	18
4½—6	46	4	20
1½	1	4½	21

On lots of a carload or more, above base discounts subject to preferential of two 5 per cent discounts on steel and 10 per cent on charcoal iron.

Lap Welded Steel—Under 10,000 pounds, 6 points under base and one 5 per cent; on 10,000 pounds to carload, 4 points under base and two 5 per cents. Quantity discounts, same as for hot rolled below. Charcoal Iron—Under 10,000 pounds; 2 points under base; on 10,000 pounds to carload, base and one 5 per cent.

STANDARD COMMERCIAL SEAMLESS BOILER TUBES

Cold Drawn

1 inch	61	3	46
1¼—1½	53	3¼—3½	48
1¾	37	4	51
2—2¼	32	4½, 5, 6	40
2½—2¾	40		

Hot Rolled

2—2¼	38	3¼—3½	54
2½—2¾	46	4	57
3	52	4½, 5, 6	46

Quantity discounts are: Under 10,000 pounds, 10 points and 5 per cent; 10,000 to 24,999 pounds, 6 points and 5 per cent; 25,000 pounds to carload, 2 points and 5 and 5 per cent; carload and over, base discount and 5 and 5 per cent. No extra for lengths up to and including 24 feet. Sizes smaller than 1 inch and lighter than standard gage to be held at mechanical tubes list and discount.

Seamless Tubing ☐

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs. 40%
15,000 ft. or 22,500 lbs. 70%

Cast Iron Water Pipe ☐

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$35.00-36.00
4-in., Birm.	38.00-39.00
4-in. Chicago	46.40-47.40
6 to 24-in. Chicago	43.40-44.40
6-in. & over, N. Y.	32.00-34.50
4-in. New York	34.50-36.50

Class A pipe $3 over Class B. Stand. fitgs., Birm. base. $90.00

Six to 24-inch, fittings, base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, $5 higher.

Pig Iron ☐ ☐

Per Gross Ton

FOUNDRY NO. 2

Chicago, furnace	$16.00
Pitts., dist. fur.	16.00
Pittsburgh, del.	16.63-17.13
Valley furnace	15.50
Cleve. fur., loc. del.	15.50
Philadelphia, del.	16.26
Virginia furnace	17.25
Granite City, Ill.	16.00
St. Louis, del.	16.85
Buff., fur., local del.	16.00
Buff., all-rail, Bost.	19.05
Buff., del. Brook.	18.50-19.00
Buff., del. Newark.	17.00-17.50
Ala., Birmingham.	12.00
Ala., del. Chicago	16.25-16.78
Ala., del. St. Louis.	16.35
Ala., del. Cincinnati	16.51
Ala., Phila., dock del.	17.00-17.25
Ala., Balt., dock del.	17.00
Ala., N. Y. dock	17.50
Ala., Bost. dock del.	17.50-17.75
Tenn., Bir. base	13.00
Tenn., del. Cinci.	16.51
*Montreal, del.	22.00
Eastern, del. Phila.	16.76

FOUNDRY NO. 2X

Buff., fur., local del.	16.50
Buff., del. Brook.	19.00-19.50
Do, Newark	17.50-18.00
Buff., all-rail, Bost.	19.55
Virginia furnace.	17.75
Eastern, del. Phila.	16.76

FOUNDRY NO. 1X

Buff., fur., local del.	17.50
Eastern, del. Phila.	17.26
Buff., del. Brook.	19.50-20.00
Buff., del. Newark.	18.00-18.50

MALLEABLE

Valley furnace	15.50
Cleve. fur., loc. del.	15.50
Pittsburgh dis. fur.	16.00
Pittsburgh, del.	16.63-17.13
Chicago, furnace	16.00
Buff., fur., loc. del.	16.50
Eastern Pa., del.	17.13-18.91
Granite City, fur.	16.50
*Montreal, del.	22.50
*Toronto, delivered	21.00

BASIC

Pitts., dist. fur.	15.50
Pittsburgh, del.	16.13-16.63
Eastern Pa., del.	16.00-16.25
Buff., fur., loc. del.	15.50-16.00
*Montreal, del.	22.00
Valley, furnace	15.00

BESSEMER

Valley furnace	16.00
Pittsburgh fur.	16.50
Pittsburgh, del.	17.13-17.63

LOW PHOS.

Valley fur. stand.	24.00
Phila., standard	22.76-26.79
Copper bear., E. Pa. furnace	22.00-23.00

GRAY FORGE

Valley furnace	15.50
Pitts., dist. fur.	16.00
Pittsburgh, del	16.63-17.13

CHARCOAL

Lake Sup., del. Chi.	23.04

SILVERY

Jackson County, O., or Pittsburgh furnace: 7%—$19.50; 8—$20; 9—$20.50; 10—$21; 11—$21.50; 12—$22; 13—$22.50; 14—$23; 15—$23.50; 16—24.

BESSEMER FERROSILICON

Jackson County, O., or Pittsburgh furnace: 10%—$21.50; 11—$22; 12—$22.50; 13—$23; 14—$23.50; 15—$24; 16—$24.50.

Iron Ore ☐ ☐

LAKE SUPERIOR ORE

Gross ton, 51½%, Lower Lake Ports

Old range bess.	$4.30
Mesabi bessemer	4.65
Old range nonbess.	4.65
Mesabi nonbess.	4.50
High phosphorus	4.40

EASTERN LOCAL ORES

Cents, unit, del. E. Pa.

Foundry and basic, 56-63%, con. (nom.)	7.50
Copper-free low phos. 58-65%	nom.

FOREIGN ORE

Cents per unit, f.a.s. Atlantic ports (nom.)

Foreign manganiferous ore, 45-55% iron, 6-10% man.	8.00
No. Afr. low phos.	7.00
Swedish basic, 65%.	7.50- 8.00
Swedish low phos.	8.00
Spanish, No. Afr. basic, 50 to 60%.	7.00
Tungsten, spot, sh. ton unit, duty pd.	$10.75-11.00
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton c.i.f.	$16.50-17.50

Manganese Ore ☐

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasian, 52-55%	nominal
So. African, 52%	18 to 19 cts.
So. Afr., 49-51%	nominal
Indian, 48-50%	nominal

Refractories ☐ ☐

FIRE CLAY BRICK

Per 1000 f.o.b. Works

First Quality

Pa., Ohio, Ill., Ky., Md., Ga., Mo.	$40.00
Alabama	43.00

Second Quality

Pa., Ohio, Ill., Ky., Md.	35.00
Missouri	35.00
Georgia, Alabama	35.00

MALLEABLE BUNG BRICK

All bases	45.00

SILICA BRICK

Pennsylvania	$40.00
Joliet, E. Chicago	49.00
Birmingham, Ala.	50.00

MAGNESITE BRICK

Per Net Ton, 9 x 4½ x 2½

Burned	$65.00
Unburned	55.00

CHROME BRICK

Per Net Ton

F.o.b. ship. point	$45.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

Fluorspar ☐ ☐

85 to 5 per cent grade

Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$11.50
Washed gravel, import duty paid tide, gross ton	$17.50

Semifinished Steel ☐

Prices Per Gross Ton

BILLETS AND BLOOMS

4 x 4-inch base

Pitts., Chi., Cleve., open-hth. & bess,	$26.00
Philadelphia	31.75
Forging, Pitts., Chi.	31.00

SHEET BARS

Pitts., Cleve., Yong.	26.00
Chicago	26.00

SLABS

Pitts., Cleve., Yong.	26.00

WIRE RODS

Pitts., Cleveland	$35.00
Chicago	36.00

SKELP

All grades, Pitts.	1.50c-1.60c

Coke ☐ ☐

Price Per Net Ton

BEEHIVE OVENS

Connellsville fur.	$2.00- 2.25
Connellsville fdry.	2.75
Connell, prem. fdry.	4.00
New River fdry.	6.00
Wise county fdry.	4.25- 5.00
Wise county fur.	3.50- 4.25

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.21- 8.81
Chi. ov., outside del.	7.50
Chicago, del.	8.25
New England, del.	10.00
St. Louis, del.	7.75
Birmingham, ovens	4.00
Indianapolis, del.	7.75
Ashland, Ky., ovens, Connell., basis	4.50
Portsmouth, ovens Connell. basis	4.50
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.00
Philadelphia, del.	8.50

Ferroalloys ☐ ☐

(In dollars, except Ferrochrome)

Ferromanganese, 78-82% tidewater, duty pd.	*$68.00
del. Pitts.	73.24
Spiegeleisen, 19-20%, dom., fur., spot†	24.00
Ferrosilicon, 50%, frieght all., c. l.	74.50
Do, less carload	82.50
Do, 75 per cent	120-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb.	85.00
2% carbon	90.00
1% carbon	100.00
Ferrodhrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	9.50
Do, spot del.	10.00
Ferrotungsten, stand., lb., cont.	0.94- 1.00
Ferrovanadium, 35 to 40%, lb. cont., on analysis	2.60- 2.80
Ferrotitanium, c.l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt., all., lb.	8.50
Do, under 1 ton	9.00
Ferrophosphorus, per ton, c. l. 17-19%, Rockdale, Tenn., basis; 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24%, $2.75 unitage	65.00
Ferromolybdenum, stand. 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Diff. to apply to quantity.

*Spot for June shipment $4 higher.

Bars

Specifications at Quarter's End Bring Large Tonnage—No Change in Third Quarter Price

BAR PRICES, PAGE 51

Pittsburgh—Carnegie Steel Co. has announced its price for third quarter at 1.60c, Pittsburgh, on steel bars. Other makers had applied this only to delivery through July. A new bar card covering certain overlapping sizes of sheets, strip, bars and plates is in prospect. Buying is heavy and although 35 to 40 per cent of present tonnage originates from the automotive trade, there is much miscellaneous buying.

Cleveland — Specifications were heavier during the week, due to expiration of second quarter contracts, and expectation of higher prices in July. Mills here and in nearby districts will be shipping the material for several weeks. In many contracts tonnage was not limited, consumers merely being given price protection on "requirements." Books for third quarter have not been opened, but leading interests continue to quote 1.65c, base, Cleveland, for July, with a proviso protecting them in the event of wage increases.

Chicago—Bar specifications have increased and business has been in the best volume in more than two years. To some extent heavier specifications are ascribed to the situation regarding prices and deliveries, although consumption among leading buyers remains heavy. Automotive demand shows no slackening. Producers continue to quote 1.70c, Chicago, in view of the lack of agreement on wages, although sellers are unwilling to contract at this price without protecting themselves against future increases.

Boston—With commercial steel bars at 1.60c, Pittsburgh, and mills taking business through July at that price, buying is in small lots, although stocks are not large.

New York—Steel bar producers for most part have extended the current price of 1.60c, Pittsburgh, through July, with delivery not later than Aug. 15, subject to ability of mills to delivery by that date. Carnegie Steel Co., Pittsburgh, has announced the same price to apply to third quarter delivery.

Philadelphia—Although some leading steel bar mills have indicated they will continue to accept specifications at 1.60c, Pittsburgh, where shipments can be made by Aug. 1, the volume of releases that came out as second quarter closed was heavy. Much the same situation, relatively, prevailed in common iron bars at 1.50c, Pittsburgh. Railroad buying has been a feature.

Tin Plate Production Is Curtailed by Heat

Tin Plate Prices, Page 51

Pittsburgh—Tin plate operations were down slightly last week at 90 to 95 per cent, as against 95 to 100 per cent of capacity a week ago. The cause was appressive hot weather in the Pittsburgh district which by disabling mill personnel in some instances, forced scheduling of fewer turns.

The slight curtailment was not due to a lack of orders, which continue to increase, and some producers are booked to capacity for three months hence. The present $4.25 price per base box on tin plate is a subject of much discussion in view of the estimated higher costs of around 35 cents per base box for tin involved alone. Inasmuch as producers do not have large stocks of tin, this has been a serious production cost item.

Tin mill black sheets during last week were advanced from 2.30c, Pittsburgh, to 2.50c, an increase of $4 a ton. This price has already been tested on certain sales.

New York—Tin plate specifications are heavy and some producers are out of the market for the year.

Plates

Orders Are Heavier and Mills Expand Production—Price for Third Quarter Is Named

PLATE PRICES, PAGE 51

Pittsburgh—Plate price for third quarter has been announced at 1.60c, Pittsburgh, by Carnegie Steel Co., though previous to July 1 this figure was applied only to July specifications for delivery by Aug. 15, at mill convenience as to delivery. Plate work still is fairly active for small tanks, but railroad and heavy structural orders do not develop.

Cleveland—The proportion of plate tonnage in current finished steel orders is increasing, amounting in one important instance to 28 per cent of the week's bookings. All consumers appear to be using more material, except railroads. The Cleveland plate mills now are operating at 75 per cent. Many inquiries are noted, but mills have quoted only for July, continuing 1.60c, base, Pittsburgh, for that period, subject to revision in the event of mill wage advances.

Chicago—Plate orders are heavier, aided by increased activity in fabricated plate products. Tank work is headed by an award of 7000 tons for tanks for the Pan American Petroleum & Transport Co. at Texas City, Tex. Brewery construction continues to furnish small lots. For a Minnesota brewery 300 tons has been placed, while similar projects are pending elsewhere. Colorado Springs, Colo., will require 1500 tons of plates for a pipe line.

Boston—Plate demand holds up well with some increase in larger tank and brewery requirements. Sturbridge, Mass., has bids on tanks. The Croft brewery rehabilitation at Roxbury will take considerable material later. Miscellaneous buying is active.

New York—Closing of 7000 tons of tank work by the Pan American Petroleum & Transportation Co. for its Texas City, Tex., development, is a feature of the plate market. General specifications came out in good volume at the close of last quarter, consumers expecting an advance shortly.

About 1600 tons of plates are reported placed by Union Carbide & Carbon Co., New York, for penstocks at Alloy, W. Va. Navy is asking bids for July 26 on 36 vessels, with 21 likely to go to private yards and 15 to navy yards.

Philadelphia — Plate operations continue to expand, with releases at the end of June the heaviest in a long time. The 40,000 tons for the naval program, up for bidding July 26, is possibly the largest individual item definitely in sight this month.

Approximately 8000 tons of plates, shapes and bars will be required by Sun Shipbuilding & Dry Dock Co., Chester, Pa., for two tankers for Sun Oil Co., Philadelphia.

Birmingham, Ala.—Birmingham Tank Works, subsidiary of Ingalls Iron Works Co., Birmingham, has taken 1000 tons of steel plates for the Southern Alkali Corp., Barberton, O., for its plant at Corpus Christi, Tex. Goslin-Birmingham

Mfg. Co., Birmingham, has taken 1500 tons of plates, including two vats, for the same buyer.

Contracts Placed

7000 tons, tanks, Pan American Petroleum & Transport Co. refinery, at Texas City, Tex., to Chicago Bridge & Iron Works, Chicago.

2500 tons, for Southern Alkali Corp., Barberton, O., for plant at Corpus Christi, Tex., 1000 tons to Birmingham Tank Works, subsidiary of Ingalls Iron Works Co., 1500 tons to Goslin-Birmingham Mfg. Co. both of Birmingham, Ala.

1900 tons, tanks, Texas Co., River Rouge, Mich., to McClintic-Marshall Corp., Bethlehem, Pa.

795 tons, for tanks for Sun Oil Co. at Cleveland, to Chicago Bridge & Iron Works, Chicago.

300 tons, tanks Kiewel Associated Products Co., Little Falls, Minn., to Graver Tank & Mfg. Corp., East Chicago, Ind.

250 tons, 24 tanks, Leader Industries, Bolivar, N. Y., to Hammond Iron Works, Warren, Pa.

220 tons, fuel tank, Paragon Oil Co., Brooklyn, N. Y., to Hammond Iron Works, Warren, Pa.

Contracts Pending

8000 tons, Sun Oil Co., Philadelphia, for two tankers to be built by its subsidiary, Sun Shipbuilding & Dry Dock Co., Chester, Pa.

1500 tons, water pipe, Colorado Springs, Colo.

1250 tons, hull, medium black and floor plates, bureau of supplies and accounts, navy department; Central Iron & Steel Co., Harrisburg, Pa., and Worth Steel Co., Claymont, Del., low on most of tonnage. Bids June 20.

225 tons, 715,000-gallon standpipe, East Lyme Water Co., East Lyme, Conn.; bids soon.

100 tons, for 400,000-gallon water tank, Galion, O.

Unstated tonnage, 100,000-gallon tank and tower, 110 feet, Flemingsburg, Ky.; bids July 7.

Wire

Buying Increases Steadily; Varied Consuming Needs Met

Wire Prices, Page 51

Pittsburgh—Number and size of wire orders still is increasing and producers booked and shipped in June more wire mill tonnage than in any month for two years. Prices are unchanged, with $1.85 quoted on new nail business, 2.10c on manufacturers' wire and 3.10c on spring wire.

Cleveland—Wire mills have such heavy backlogs for July, on second quarter specifications, that sales efforts are not being pushed, pending more definite determination of prices. Where buyers have insisted on protections for July leading mills are offering to take orders for plain wire at 2.10c, base, Pittsburgh, and $1.85 for nails, subject to revision if production costs are increased. Users are increasing inventories; some leading mills are operating at 65 per cent; an eastern mill is said to have sufficient business on books to operate near capacity for two months.

Chicago—Shipments of wire products are steady and in relatively heavy volume. Manufacturers' wire demand is holding well and some gains continue in movement to farm areas. The outlook for farm buying has been improved materially by recent advances in grain. Producers defer third quarter contracting and on current business quote recent levels of $1.90 for carload lots of wire nails and 2.15c for plain wire.

Boston—Wire mills are taking business through July at unchanged prices with plain wire 2.20c, Worcester. Despite recent active buying, mills are taking business at an encouraging rate.

Railroads

Rail Buying Is on Increase; Spike Prices Advanced $5

Track Material Prices, Page 51

Placing of 4100 tons of 110-pound rails by the St. Louis & San Francisco with Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., and several smaller orders from other railroads has built sufficient backlog for a schedule of rail rolling to start July 10. Tennessee company also has on books an order for 480,000 tie plates for the Seaboard Air Line, with other tie plate orders in prospect.

Edgar Thomson mill of Carnegie Steel Co., Pittsburgh, is building up a backlog of small rail releases and may be able to schedule a rolling soon. Chesapeake & Ohio has awarded about 1000 tons, principally spikes and tie plates. Missouri Pacific will complete purchase this week of about $575,000 worth of steel in various forms, including tie plates, spikes, bolts, nuts, shapes and bars.

New York Rapid Transit has been authorized to place five aluminum cars with the Pullman Car & Mfg. Corp., Chicago.

Railroad spikes have been advanced to 2.40c, mill, effective July 1, for July specification and shipment not later than Aug. 15. Other rail accessory prices will not be changed for this delivery.

The Pennsylvania announces a maintenance program for which a substantial tonnage of steel is being placed. In addition to car and locomotive repairs, for which 2000 men have been recalled at Altoona Pa., and 900 at Columbus, O., a program of track maintenance will be undertaken soon. The Reading Co. is taking on 300 men at Reading, Pa., shops.

Algoma Steel Corp., Sault Ste Marie, Ont., through co-operation of the Dominion government, will be given an order for 30,000 tons of steel rails for the Canadian National railroad, to be delivered and paid for as need arises, an unemployment measure. The government will guarantee the company's bank loan of $660,000 to finance the deal. The rails are booked at $44 per ton. Dominion Steel & Coal Corp., Sydney, N. S., has booked 3500 tons of rails for the South African government, the first order from this source for this company since 1931. An additional blast furnace was blown in June 28, employing 100 men.

Locomotives Placed

Delaware, Lackawanna & Western, six oil-electric locomotives, to the American Locomotive Co., Schenectady, N. Y.

Rail Orders Placed

Canadian National, 30,000 tons, to Algoma Steel Corp., Sault Ste. Marie, Ont.

South African government, 3500 tons, to Dominion Steel & Coal Corp., Sydney, N. S.

St. Louis & San Francisco, 4100 tons 110-pound, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Strip

Bookings Continue Heavy; Prices Go to Higher Level

Strip Prices, Page 51

Pittsburgh—Weirton Steel Co., Weirton, W. Va., has announced 1.65c, Pittsburgh, and 1.75c, Chicago, on hot-rolled steel, effective immediately on all new business, on specifications for delivery through third quarter. This is an increase of $3 to $4 per ton over second quarter prices.

Republic Steel Corp., Youngstown, O., has announced its cold-rolled steel price for third-quarter delivery at 2.25c, base, Pittsburgh and Cleveland, and 2.45c, Worcester. This is an advance of $5 per ton over second quarter prices.

Tonnage being booked shows no sign of a let-down and a fair backlog is being accumulated. Strip shipments are now somewhat delayed.

Cleveland—Stripmakers have not

opened books for full third quarter, but some orders for hot-rolled have been taken for spcifying in July at 1.60c, base, Pittsburgh, an advance of $1 a ton over the 1.55c market prevailing. A substantial tonnage was covered at 1.60c by a consumer in this district. Makers of cold-rolled strip also are limiting sales to July, generally at 2.00c, the price recently applying only to small lots. Releases on second quarter contracts during the week were heavy, not all the material can be shipped by July 15. Announcement of an increase of $3 on hot-rolled and $5 on cold-rolled over second quarter prices by two producers probably will be generally followed.

Chicago—Strip specifications continue heavy, aided by expiration of contracts and higher prices scheduled for July. Third quarter contracts have been taken only with the provision that mills will be protected against further advances. The market is 1.70c, Chicago, for hot strip and 2.00c, Pittsburgh-Cleveland, for cold-rolled.

Boston—Cold-rolled strip mills are taking new business at 2.20c, Worcester, through July, but are reluctant to go beyond Aug. 15 at that quotation. Releases have been heavy and while some expect a decline in buying this is not yet evident.

Philadelphia—Strip steel sellers are quoting 1.60c, Pittsburgh, on hot-rolled and 2.00c, Pittsburgh, on cold-rolled, the latter still subject to concessions. These prices have been quoted generally for July specification, and represent an increase of about $3 a ton over second quarter prices on hot-rolled strip. Specifications at the close of June were heavy, with the possibility of lighter buying over the next few weeks.

Bar Iron Wages Unchanged For July and August

Wages in bar iron mills having contracts with the Amalgamated Association of Iron, Steel and Tin Workers will be unchanged in July and August, puddlers to receive $9.30 per ton. The average sales price of bar iron in the past two months was 1.50c, as determined last week by representatives of the mills and the amalgamated association. Following are further price comparisons:

	1933	1932	1931
Jan.-Feb.	1.50c	1.65c	1.70c
March-April	1.50c	1.65c	1.70c
May-June	1.50c	1.50c	1.70c
July-Aug.		1.45c	1.70c
Sept.-Oct.		1.50c	1.65c
Nov.-Dec.		1.45c	1.65c
Yearly average		1.53c	1.66c

Workers' Buying Power Less Than Half of 1929

American industrial workers' purchasing power today, wages and prices considered, is only 46.3 per cent of what it was in 1929, according to the National Industrial Conference board, New York.

Wage rates have been reduced 19.3 per cent; working hours shortened 26.9 per cent; and the volume of employment has declined 43.4 per cent. Combining these factors, the board finds the industrial population as a whole including employed and unemployed, is receiving only 33.4 per cent as many dollars as in 1929. Cost of living then is considered in determining the aggregate purchasing power.

"Small wonder that efforts to increase industrial activity meet with little encouragement," comments the board. "The consequences of lost purchasing power have multiplied in an ever widening circle."

STEEL MILL Equipment

ELECTRICALLY DRIVEN 50-TON ORE TRANSFER CAR

. . with four-wheel wide gauge trucks; welded steel bolsters; roller bearing axles; double undercut, center discharge, motor operated gates; hopper sides and gates heated to prevent material from freezing and sticking; and full electric sanding equipment.

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Structural Shapes

Small Projects Account for Increasing Proportion of Current Structural Tonnage —Industrial Plant Additions Begin to Figure in Shape Awards

STRUCTURAL SHAPE PRICES, PAGE 51

Pittsburgh—Carnegie Steel Co. has opened its books for third quarter structural business at 1.60c, Pittsburgh. Until this policy was announced on Friday, producers had been extending base prices on structural shapes cautiously and every prospect points to a change as soon as developments at Washington are clear. Structural inquiry has been curtailed by this factor but some projects are coming out for bids during the early part of this month. Bids have been closed on the 200-ton Turtle Creek, Pa., elementary school. An $800,000 chapel for the University of Pittsburgh is expected to be constructed. A $157,000 group of four 2-story brick buildings for a Marine hospital at Pittsburgh will close July 19. Structural steel for improving the Smithfield street bridge will be bid to the department of public works, Pittsburgh, until July 12.

Cleveland—Structural shape orders, individually small, now constitute a larger proportion of the finished steel tonnage booked in this district than in over two years. This is encouraging to fabricators as public work has not increased in the same ratio. The Libbey-Owens-Ford Glass Co., is taking bids on 150 tons for a plant addition at Toledo, O., and the Hammermill Paper Co., has awarded 370 tons for a plant at Erie, Pa., to the Erie Structural Steel Co. Protections are out for July at 1.60c, base, Pittsburgh, for plain material.

Chicago—Additional inquiries for postoffices are appearing but most of these are small and do not involve the structural tonnage anticipated when the public works program is more fully under way. Awards are few, headed by 4700 tons for a Kansas City, Mo., courthouse. Inquiries for private work take only small tonnages.

Boston—Structural steel demand, while still lagging, has a slightly brighter outlook and a few small tonnages have been placed, including 225 tons for a Boston school addition. Bids on the Cambridge, Mass., post office, first rejected, close again July 18. There is more small work active. Lewiston, Me., post office bids go in July 10. Plain material continues at 1.60c, Pittsburgh.

New York—Structural steel demand is slightly more active. State buildings at Coxsackie, N. Y., taking 1500 tons have been placed and bids are in on the New York Central West side viaduct, 15,000 tons. James Stewart & Co. is reported low. Mills are not protecting fabricators far in advance at 1.60c, Pittsburgh, on plain material, but are covering through July at that figure.

Philadelphia—Shape prices of 1.60c, nearest mill, will be extended on July shipments, according to present indications. Structural activity is slightly improved as compared with a month ago, but it will take the impetus of the government construction program to provide anything in the way of real tonnage, it is believed.

Contracts Placed

4700 tons, courthouse, Kansas City, Mo., to Kansas City Structural Steel Co. Swenson Construction Co., Kansas City, general contractor.

1500 tons, state vocational school buildings, Coxsackie, N. Y., to Shippers Car Line Inc., Milton, Pa.; Amsterdam Building Corp., New York, general contractor.

700 tons, hoist and crusher building and head frame, Homestake Mining Co., Lead, S. Dak., to Worden-Allen Co.

650 tons, Y. M. C. A., Wilkesbarre, Pa., to Anthracite Bridge Co., Scranton, Pa.

580 tons, bridge, Lycoming county, route 176, Pennsylvania, to Lackawanna Steel Construction Co., Buffalo.

500 tons, bridge, Sandy Hook, Conn., to Lackawanna Steel Construction Co., Buffalo.

500 tons, Blatz Brewing Co., Milwaukee, to Milwaukee Bridge Co., Milwaukee.

440 tons, building, Philadelphia, to Morris Wheeler & Co., Philadelphia, through S. H. Levin, contractor.

400 tons theater alterations Madison avenue New York to George A. Just Co. Long Island City, N. Y.

370 tons, plant for Hammermill Paper Co., Erie, Pa., to Erie Structural Steel Co., Erie.

365 tons, hospital, Yonkers, N. Y., to Shippers Carline Co., Milton, Pa.

325 tons, two bridges, Detroit, for New York Central railroad to R. C. Mahon Co., Detroit.

310 tons, arch centering, James river bridge, Maryland, to Blaw-Knox Co., Pittsburgh.

230 tons, state buildings, Albion, N. Y., to Leach Steel Corp. through A. Friederich & Sons Co., Rochester, N. Y.

225 tons, addition, William Barton Rogers school, Hyde Park district, Boston, to New England Structural Co., Everett, Mass.; Rugo Construction Co., Boston, general contractor.

200 tons, bridge, Golf, Ill., for Chicago, Milwaukee, St. Paul & Pacific railroad, to Wisconsin Bridge & Iron Co., Milwaukee.

180 tons, highway bridge, Schneider, Ind., to American Bridge Co., Pittsburgh.

175 tons, bottling house, National Brewing Co., Baltimore, to Maryland Steel Products Co., Baltimore.

165 tons, two bridges, West Detroit, Mich., for Grand Trunk Western railroad, to American Bridge Co., Pittsburgh.

150 tons, bridge superstructure, Catoctin Creek, Maryland, contract F-168-3-52, to American Bridge Co., Pittsburgh.

150 tons, powerhouse, Jeddo Highland Coal Co., Jeddo, Pa., to Shoemaker Bridge Co.

130 tons, building, American Commercial Alcohol Co., Philadelphia, to Morris, Wheeler Co., Philadelphia.

125 tons, building, Gould Academy, Bethel, Me. to New England Structural Co. Everett, Mass.; R. L. McPhail, general contractor.

120 tons, girder beam spans, Missouri-Kansas-Texas railroad, San Antonio, Tex., to American Bridge Co., Pittsburgh.

100 tons, building, Lanette Bleachery & Dye Works, Lanette, Ala., to Virginia Bridge & Iron Co., Birmingham, Ala.; Batson-Cook Co., West Point, Ga., general contractor.

Shape Awards Compared

	Tons
Week ended July 1	13,290
Week ended June 24	17,373
Week ended June 17	17,230
This week in 1932	29,533
Weekly average, 1932	14,285
Weekly average, 1933	14,921
Weekly average, June	12,878
Total to date, 1932	431,905
Total to date, 1933	402,870

Contracts Pending

30,000 tons, transmission towers for the bureau of light and power, Los Angeles; bids July 14.

15,000 tons, viaduct, New York Central railroad, West side Manhattan, New York City; James Stewart & Co., New York, low.

3500 tons, suspension bridge, York river, Independence Bridge Co., Gloucester Point to Yorktown, Va.; bids July 14; Robinson & Steinman, New York, engineers.

550 tons, building, Burke brewery.

Long Island City, N. Y.
500 tons, state school buildings, Wassaic, N. Y.; W. T. Wark Co., Philadelphia, low on general contract.
425 tons, rebuilding Campostella bridge, Norfolk, Va.; Hofheimer Construction Co., Norfolk, low, $124,822.25.
325 tons, postoffice, Cambridge, Mass., bids March 28 rejected. Will probably be readvertised.
300 tons, power plant, Marion, Ind.; Edwin E. Young, Chicago, general contractor.
300 tons, post office, Cambridge, Mass.; bids July 18.
250 tons, Y. M. C. A. building, Burlington, Vt.
225 tons, addition and alterations, Frick Museum and library, New York.
200 tons, state highway bridge, Loveland, Colo.
200 tons, state bridge, Brunswick, Md.
175 tons, store and office building, Trenton, N. J.; bids reported asked.
155 tons, bridge Marion county, Oregon; bids July 6.
150 tons, plant annex for Libbey-Owens-Ford Glass Co., Toledo, O.
125 tons, postoffice, Newbury, N. C.
100 tons, building for Cleveland Cloth Mills, Shelby, N. C.
Unstated tonnage, federal projects on following dates: U. S. Narcotic Farm, Lexington, Ky., July 28; Breckenridge, Tex., post office, July 24; Pittsburgh, marine hospital quarters, July 19; Grand Forks, N. D., post office addition, July 27.

Concrete Bars

Demand for Reinforcing Bars Is More Active in Several Districts—Award of 3250 Tons in East Reported—Except on Large Tonnages, Prices Are Stronger

REINFORCING BAR PRICES, PAGE 51

Chicago—Orders for small miscellaneous lots of reinforcing bars have increased rather rapidly and business is considerably ahead of the rate of the past two months. Large tonnages are lacking in recent awards and inquiries, with private work slow to increase. Inquiries have yet to appear in any volume for projects financed by provisions of the public works program but are expected in the near future. Prices are stronger, buyers showing less disposition to attempt to obtain concessions. The spot market is quoted 1.75c for billet bars and 1.50c for rail steel, with producers declining to cover on future requirements.

Pittsburgh—Specifications for new billet steel bars are being placed through early this month at least, at the present price of 1.75c, Pittsburgh, on cut lengths. A sewage disposal plant at Rahway, N. J., calls for 500 tons and the successful contractor has been announced on 3000 tons in the Jones beach, Long Island project.

Cleveland—An increase in the mill price of new billet steel bars, recently quoted 1.50c, base, Cleveland, is expected shortly. A few small industrial jobs were booked here during the week. For an Erie railroad bridge at Elmira, N. Y., 300 tons are pending.

New York—Concrete bar lettings are heavier, led by 3250 tons reported placed for Jones Beach, Long Island, N. Y., bridges to be rolled by a Pittsburgh mill. Two warehouses and a highway project, taking mostly mesh, about 600 tons, have also been placed. On larger tonnages the 1.75c, Pittsburgh, price for cut lengths is being shaded.

Boston—Reinforcing bars are moving slowly in small lots. Concrete Steel Co. will furnish bars for the Barton school addition. Two bridges and a Connecticut highway will take fair tonnages. Prices are untested on sizable business and unchanged at 1.60c, Buffalo.

Philadelphia—Award of 1600 tons for the Pennsylvania piers in Baltimore is expected to be announced momentarily. Demand for reinforcing bars is otherwise light, with two jobs totaling 170 tons and placed with one seller outstanding. The market is nominally 1.86c, Philadelphia, on billet steel bars in cut lengths.

Contracts Placed

3250 tons, channel bridges, Jones Beach, Long Island, N. Y., to National Bridge Co., Long Island City, N. Y.
985 tons, federal courthouse, St. Louis, to LaClede Steel Co., St. Louis: through N. P. Severin Co., Chicago, general contractor.
600 tons, Fifth street viaduct, Richmond Bridge Corp., Richmond, Va., to Virginia Steel Co., Richmond; T. A. Loving Co., Goldsboro, N. C., general contractor. Reported June 19 as going to unstated fabricator.
365 tons, mainly mesh, paving and grade elimination, Jones Beach Parkway, Nassau county, New York, to Kalman Steel Corp., Bethlehem, Pa.; Johnson, Drake & Piper Inc., Freeport, L. I., N. Y., general contractors.
225 tons, warehouses, Interboro Brewery, Brooklyn, to Fireproof Products Co., New York; George Ram, general contractor.
120 tons, state bridge, Lycoming county, Pennsylvania, to Taylor-Davis Inc., Philadelphia; also 50 tons for a power plant at Jeddo, Pa.
100 tons, building, Lanette Bleachery & Dye Works, Lanette, Ala., to Connors Steel Co., Birmingham; Batson-Cook Co., West Point, Ga., general contractor.
100 tons, Washington state highway paving, to Northwest Steel Rolling Mills, Seattle.
100 tons, addition, William Barton Rogers school, Hyde Park district, Boston, Mass., to Concrete Steel Co., Boston; Rugo Construction Co., Boston, general contractor.
100 tons, power plant, city hospital, Baltimore, to American Steel Engineering Co., Philadelphia; M. A. Long Co., Baltimore, general contractor.
Unstated tonnage, buildings, state training school, Albion, N. Y., to Kalman Steel Corp., Bethlehem, Pa.; through A. Friederich & Son Co., Rochester, N. Y.

Contracts Pending

500 tons, sewage disposal plant, Rahway, N. J.; E. H. Latham & Co., Bedford, O., general contractor.
378 tons, bridges and highway work in ten counties in Colorado; Bids June 26.
300 tons, suspension bridge, York river, Independence Bridge Co., Gloucester Point to Yorktown, Va.; bids July 14; Robinson & Steinman, New York, engineers.
150 tons, two bridges in Valley county, Idaho; bids July 7.
125 tons, superstructure, coal storage system, Mitchel Field, N. Y., bids June 2 rejected. One of several scores of army quartermaster projects temporarily abandoned.

Concrete Awards Compared

	Tons
Week ended July 1	5,945
Week ended June 24	3,067
Week ended June 17	3,215
This week, 1932	843
Weekly average, 1932	3,920
Weekly average, 1933	3,087
Weekly average, June	2,406
Total to date, 1932	115,297
Total to date, 1933	83,350

Cold-Finished Sales in June Are Best in Years

Cold Finished Prices, Page 51

Pittsburgh—The price of 1.70c. base, Pittsburgh, on cold-finished steel bars is being extended to apply for July. Some producers are making this announcement conditional but others have accepted buyers' contracts for July with shipment to be completed by Aug. 15. Heavy buying is noted from the automotive trade. Cold-drawn bar sales in June were the heaviest in almost three years.

Pipe

Prospect for Pipe Business Considered Brighter—Clarification of Financing Plans Awaited

PIPE PRICES, PAGE 51

Pittsburgh—Steel pipe shipments expanded in June to the best volume of any month this year. Production has been undergoing some improvement but it is mainly for mill stocks at the producing plant and in the field. Actual demand has been heavier only on small butt weld sizes. Jobbers, mill supply houses and miscellaneous building repair work have been the chief outlets. There is no line pipe business prominently before the trade and drill pipe for oil country use is practically lacking in demand.

Chicago—The cast iron pipe outlook is bright, based on work in prospect and on the number of projects which will be out for bids as soon as federal funds for financing are assured. Chicago has placed 1370 tons of 12 and 36-inch pipe and is taking bids on 855 tons of 8-inch. Milwaukee will require 625 tons for waterworks and sewage disposal plant construction. Ann Arbor, Mich., has divided 400 tons between two producers. Prices are stronger and this has induced the closing on an increased number of small tonnages.

A producer in this district is reported to have booked most of a 9000-ton pipe line.

Boston—Cast pipe prices are not holding on attractive business at the recent advance. Part of requirements for Brockton, Mass., placed last week, went at $37.60, f.o.b., South Hanson, Mass., for class C, 24-inch, B. & S., in 12-foot lengths. On 745 lengths, class 200, centrifugal pipe, the low bid was $4.73 a linear foot, delivered siding, Brockton. Sturbridge, Mass., is buying close to 500 tons.

New York—Cast pipe buying is light. New York city will buy several hundred tons this month. Washington closes next week on 1000 tons. Water line projects for state institutions will take about 300 tons. Prices are untested.

Demand for steel pipe is more active. Several thousand tons will be required by the Pan American Petroleum & Transport Co. for its project at Texas City, Tex., with specifications to be brought out over several months. About 550 tons of 14-inch pipe for the Rip Van Winkle bridge at Catskill, N. Y., is reported placed with a Pittsburgh mill.

Birmingham, Ala.—Demand for soil pipe has improved. Coosa Pipe & Foundry Co., Gadsden, Ala., has called 200 men back to work and two other shops there are getting ready for resumption.

Cast Pipe Placed

1370 tons, Chicago; 1000 tons, 12-inch to Glamorgan Pipe & Foundry Co., Lynchburg, Va., 370 tons, 36-inch to United States Pipe & Foundry Co., Birmingham, Ala.

400 tons, 6, 8 and 12-inch, Ann Arbor, Mich., to American Cast Iron Pipe Co., and Central Foundry Co., Birmingham, Ala.

Steel Pipe Placed

Unstated tonnage, 1500 feet, 20-inch i. d. plate rivet weld pipe, U. S. engineer, Jacksonville, Fla., to Chicago Bridge & Iron Works, Birmingham, Ala.

Cast Pipe Pending

1000 tons, 4 to 16-inch, Washington; bids July 12 with district commissioners.

855 tons, 8-inch, Chicago; bids July 7.

500 tons, 12-inch, Milwaukee; bids taken.

141 tons, small sizes and fittings, water line, Kings Park hospital, New York.

125 tons, various sizes, Milwaukee sewage disposal plant; bids taken.

100 tons, Yonkers, N. Y.; bids in.

Steel Pipe Pending

900 tons, 60-inch for Metropolitan district commission, Boston; bids July 6.

Bolt, Nut Users Taking Large Lots on Price Rise

Bolt, Nut, Rivet Prices, Page 51

Bolt, nut and rivet sales and specifications maintain the improvement noted recently. Bolts and nuts continue 73 off while large rivets are quoted $5 a ton higher at 2.50c, Pittsburgh, and 2.60c, Chicago. Railroads are moderately heavier buyers of bolts, nuts and rivets. Farm implement manufacturers at Chicago are increasing requirements.

Nut and bolt manufacturers at Cleveland received heavy specifications from the automotive industry in the last week of the second quarter. New contracts at prices recently announced for July are being signed.

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direct arc melting and refining furnaces for tool and alloy steel ingot production, for steel castings manufacture, ... and the making of plain steels as are used in the Lectromelt billet size ingot process for reinforcing bars . . . . have now been made even more rapid and economic by the new patent . . .

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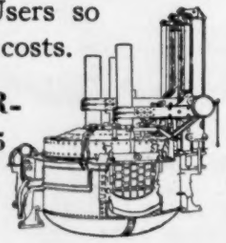

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Pig Iron

Producers Declining To Quote For Shipment Beyond Aug. 1—Canadian Prices Easier

PIG IRON PRICES, PAGE 52

Pittsburgh—Small sales predominated last week and important buyers are either covered or not negotiating. However, the price is strong at $16 on foundry and malleable irons, with $16.50 the bessemer price and $15.50 on basic, all Pittsburgh district furnace base. Shipment of steelworkers iron from Clairton, Pa., into Monessen, Pa., has ceased since the Monessen, Pa., stack blew in July 1. A price advance is rumored but held distant until at least wage schedules are determined under the national industrial recovery act.

Cleveland—Shipments from lake furnaces in June were approximately 40 per cent larger than in May. The market appears quieter since producers here announced they would not book more iron for delivery beyond Aug. 1 before costs become more clearly defined. The current price is firm at $15.50, base, furnace, for local and outside delivery. Sales in the week totaled approximately 4000 tons; few new inquiries developed.

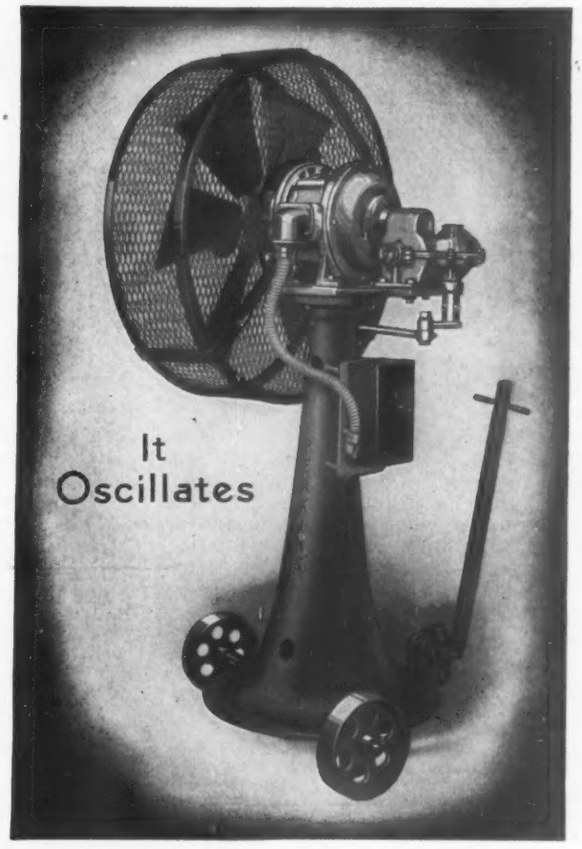
Chicago—Demand continues to exceed expectations and July gives indications of maintaining the gains recorded during June. Farm implement manufacturers have plans for heavier operations in the near future, while automobile requirements continue active. Larger orders are apearing from some sanitary ware manufacturers, while ingot mold production has been stimulated by further gains in steelmaking operations and by the fact that stocks in hands of mills are light. The market on No. 2 foundry and malleable iron continues firm at $16, furnace, and sellers decline to sell ahead. In some cases orders are being taken only for July shipment, although previously consumers had bought through third quarter.

Boston—New buying is in small lots, but shipments against old contracts are active. Sellers are not taking fourth quarter business at present prices which are steady and unchanged with the local producer firm at $16, furnace, and the usual differentials. Reports of the Mystic furnace going into blast soon are unfounded. The furnace will be relined first.

Philadelphia—One eastern Pennsylvania producer, in operation, shipped more tonnage in June than he produced. Total sales are not as heavy as a week ago when substantial tonnages of basic were bought. Sellers generally are refusing to quote for shipment beyond Aug. 1. Expectations are that books will be opened around the latter part of this month for business over the remainder of the year, and at higher prices. An increase of at least $2 is being discussed in some quarters. One eastern Pennsylvania furnace, down for many months, may go into blast in August. Another is tentatively scheduled for early fall.

New York—Sellers are refusing to quote for shipment beyond Aug. 1. Indications are that books will be opened in the latter half of this

PERKINS Man Coolers Reduce Operating Costs



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Readily moved from place to place, they bring comfort to men working in hot places, resulting in decreased labor turnover, increased production and fewer accidents.

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month for shipment beyond, with an advance all but assured. Releases have been expanding steadily. The first barge shipment of Buffalo iron this season arrived here recently, involving 500 tons.

Buffalo—Furnaces have decided not to contract for more than a month ahead. Lackawanna plant of the Bethlehem Steel Co. has lighted its second blast furnace. Four furnaces are now blowing in this district and three more will probably go into blast within the next three or four weeks.

Cincinnati — Southern furnaces have not yet followed restrictions of northern sellers in this district who refuse to quote beyond July 31 delivery, but part of the southern iron business is being taken subject to furnace confirmation. A rush of buying of northern foundry iron, to cover at present prices, brought orders for about 2000 tons at full quotations, $16, base, Hamilton, or $17.01, base, delivered Cincinnati, with a 25-cent silicon differential in force.

St. Louis—Hickman, Williams & Co. here have been named exclusive selling agents for the stock of iron made by and in the yards of the St. Louis Gas & Coke Corp., which was recently placed in receivership. This stock of iron amounts to about 230,000 tons, and deliveries on contracts, which have been held up, are now being resumed. Demand continues active and prices hold firm. Melt has increased, with shipments going forward in large volume, although the June total will fall below the May figure, due to suspension of deliveries by the above-named producer.

Birmingham, Ala.—Buying is active and production has increased. Base price is firm at $12, f.o.b. furnaces, No. 2 foundry. Sloss-Sheffield Steel & Iron Co. has blown in its second city furnace; Tennessee Coal, Iron & Railroad Co. has blown in one of its Ensley furnaces and is preparing to light the second large furnace at Fairfield. Republic Steel Corp. will blow in its second furnace at Thomas during the month and the Tennessee company two more of the Ensley furnaces.

Toronto, Ont.—Downward revision of prices was the only feature of interest the past week. A reduction of $1.60 per ton, effective in both the Toronto and Montreal districts, it is the first change made in the last three years. According to official announcements at least three blast furnaces will be in blast by the end of next week. Current prices are as follows: No. 1 (2.25 to 2.75 silicon) $21; malleable, $21; No. 2, (1.75 to 2.25 silicon) $20.50, Toronto. Montreal quotations, No. 1 and malleable, $22.50; No. 2 and basic, $22.

NOTICE OF SALE

The A. G. REEVES STEEL CONSTRUCTION Co.
Alliance, Ohio

Notice is hereby given that on the 8th day of July, 1933, A.D., at 9:30 o'clock A.M., and continuing until completed, by virtue of a resolution of the Board of Directors of The A. G. Reeves Steel Construction Company duly passed, that all the land and buildings known as the plant of said company located in the City of Alliance, Stark County, Ohio, together with all equipment, machinery, tools, inventory, work in process, etc., will be sold at public auction to the highest bidder; that a complete list of the property so to be sold is on file in the office of the company in the City of Alliance, Stark County, Ohio, and open for inspection to all prospective purchasers and others interested at any reasonable hour on the day of sale or prior thereto; that said plant, machinery and equipment and all property so to be sold will be open for inspection to all prospective purchasers and others interested at any reasonable hour on the day of the sale or prior thereto. The property to be sold as herein described will be sold in one lot only.

Sale to commence at 9:30 o'clock A. M., Saturday, July 8th, 1933, at the plant of the Company located at No. 338 East Rush Street in said City of Alliance, Stark County, Ohio. Terms of sale—cash. A cash deposit of $10,000.00 will be required either in cash or certified check by all who intend to bid, to be deposited with the Treasurer of the Company prior to the commencement of said sale.

The right is expressly reserved to the seller or to any officer or stockholder of the seller to bid and buy the property herein offered for sale.

The A. G. REEVES STEEL CONSTRUCTION Co.
By— A. G. Reeves, *President*
By— J. R. Temple, *Secretary*

Coke

Shipments Greatly Increased And Price Advance General

Coke Prices, Page 52

Additional active blast furnaces have brought a heavy increase in demand for furnace coke and expiration of first-half contracts stimulated specifications and shipments at the end of June. At Chicago foundry coke shipments in June were 50 per cent greater than in May. H. C. Frick Coke Co., Pittsburgh, started 175 beehive ovens in the past week.

Furnace coke is $2, Connellsville ovens, foundry coke $2.75 and premium brands $4. By-product foundry coke is advanced 25 cents a ton in eastern Pennsylvania, beehive being unchanged. Recent advance of 50 cents per ton at Chicago has caused an increase in shipments under contracts at the former price. By-product foundry coke has been advanced 50 cents and domestic grades 25 cents in the Cincinnati market. St. Louis and Birmingham markets are strong but prices have not advanced.

Semifinished Prices Hold For July Purchases

Semifinished Prices, Page 52

Prices on sheet bars, billets and slabs are being carried forward into July for an indefinite period at $26 base, Pittsburgh, Youngstown, O., or Cleveland. Forging billets are quoted $31 into early July. Carnegie Steel Co. Friday formally announced that it had opened books for the third quarter with the $26 price continued. Stocks of semifinished steel in consumers' hands are universally low and several nonintegrated strip steel producers in the Pittsburgh district are finding difficulty building up a stock of billets. Much of the active capacity at both the Edgar Thomson and Duquesne works of Carnegie Steel Co. is now on sheet bars for tin plate manufacturers. Wire rods are quoted $35 for the rest of this month, Pittsburgh base.

Scrap

Prices Advancing Strongly as Needs Outstrip Supply in Most Centers—Buying Heavy

Pittsburgh—Indicating that dealers may be more interested in orders than profits, the scrap trade accepted $11.75 on about 5000 tons of scrap purchased by a leading interest recently. In addition to this tonnage, approximately 7000 tons moved direct into the buyer's mills from a subsidiary railroad. Before this sale, many brokers were determined not to sell below $2.25 to $12.50, an opinion justified in view of coverage during the past week in some instances at $11.75 on $11.75 orders.

H. C. Frick Coke Co. has withdrawn offers to sell 3000 tons of scrap in old coal tipples and rails. At least half of this tonnage has moved into Donora, Pa., works of American Steel & Wire Co.

Principal railroads have postponed

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.00 to 9.00
Boston, dealers	5.50 to 6.00
Buffalo, No. 1	10.00
Buffalo, No. 2	8.75 to 9.25
Chicago	9.00 to 9.50
Cleve., No. 1	9.50 to 10.00
Cleve., No. 2	9.00 to 9.50
Det., No. 1	8.50 to 9.00
Det., No. 2	7.50 to 8.00
E. Pa., del. mill	9.50
E. Pa., No. 2 del.	8.00 to 8.50
Federal, Ill.	8.25 to 8.75
Granite City, Ill.	7.25 to 7.75
N. Y., deal. R. R.	6.00 to 6.50
N. Y., deal. No. 2	5.00 to 5.50
N. Y. deal. yd.	2.50 to 3.00
Pitts., No. 1	11.50 to 12.00
St. L. No. 1 del.	8.25 to 8.75
Valleys, No. 1	12.00 to 12.50

COMPRESSED SHEETS

Buffalo, dealers	8.75 to 9.25
Chi. (Factory)	7.75 to 8.25
Cleveland	9.00 to 9.50
Detroit	8.50 to 9.00
E. Pa. new mat.	8.00 to 9.00
Pittsburgh	11.50 to 12.00
Valleys	11.50 to 12.00

BUNDLED SHEETS

Buffalo	5.00 to 5.50
Cincinnati, del	4.75 to 5.25
Cleveland	7.00 to 7.50
Eastern Pa.	7.00 to 7.50
Pittsburgh	10.50 to 11.00
St. Louis	4.50 to 5.00

SHEET CLIPPINGS LOOSE

Chicago	3.50 to 4.00
Cincinnati	3.00 to 3.50
Detroit	3.50 to 4.00
St. Louis	4.00 to 4.50

STEEL RAILS SHORT

Birmingham	10.50 to 11.00
Boston, dealers	4.75 to 5.25
Buffalo	12.00 to 12.50
Chicago (3 ft.)	10.50 to 11.00
Chicago (2 ft.)	11.00 to 11.50
Cincinnati, del.	10.50 to 11.00
Detroit	10.50 to 11.00
Pitts. (open-hearth, 3 ft. and less)	12.25 to 12.75
St. Louis	10.50 to 11.00

STOVE PLATE

Birmingham	7.00 to 7.50
Boston, dealers	2.50 to 2.75
Buffalo	8.75 to 9.00
Chicago, net	7.00 to 7.50
Cinci., deal. net	4.75 to 5.25
Detroit, net	4.00 to 4.50
Eastern Pa.	7.00 to 7.50
N. Y. deal. Fdry.	5.00
St. Louis	7.00 to 7.50

COUPLERS, SPRINGS

Buffalo	11.00 to 11.50
Chicago	10.50 to 11.00
Eastern Pa.	10.50 to 11.50
Pittsburgh	13.00 to 13.50
St. Louis	8.50 to 10.00

ANGLE BARS—STEEL

Chicago	10.00 to 10.50
St. Louis	9.00 to 9.50

LOW PHOSPHORUS

Buffalo, billets and bloom crops	10.50 to 11.50
Cleveland bil. and bloom crops	12.00 to 13.00
Eastern Pa.	11.50 to 12.00
Pittsburgh billet bloom crops	13.75 to 14.25
Pitts., sheet bar crops	13.75 to 14.25

FROGS, SWITCHES

Chicago	8.50 to 9.00
St. Louis	9.50 to 10.00

SHOVELING STEEL

Chicago	9.00 to 9.50
Cleveland	6.25 to 6.50
St. Louis	8.50 to 9.00

RAILROAD WROUGHT

Birmingham	7.00 to 7.50
Boston, dealers	2.00 to 2.50
Buffalo, No. 1	6.50 to 7.00
Buffalo, No. 2	10.50 to 11.00
Chi., No. 1, net	8.00 to 8.50
Chi., No. 2	9.00 to 9.50
Cinci., No. 2	7.50 to 8.00
Eastern Pa.	10.00 to 10.50
N. Y., No. 1, deal.	4.00 to 5.00
Pitts., No. 1	11.50 to 12.00
St. Louis, No. 1	6.00 to 6.50
St. Louis, No. 2	8.00 to 8.50

SPECIFICATION PIPE

Boston	3.00 to 4.00
Eastern Pa.	7.50 to 8.50
N. Y., deal.	3.25 to 3.75

BUSHELING

Buffalo, No. 1	8.75 to 9.25
Chicago, No. 1	7.50 to 8.00
Cinci., No. 1 deal.	5.25 to 5.75
Cinci., No. 2	2.75 to 3.00
Cleve., No. 2	6.25 to 6.75
Det., No. 1 new	7.00 to 7.50
St. Louis, No. 1	5.25 to 5.75
Val. new No. 1	11.00 to 11.50

MACHINE TURNINGS

Birmingham	3.00 to 3.25
Boston, dealers	2.50 to 2.75
Buffalo	6.25 to 6.50
Chicago	5.50 to 6.00
Cinci., deal.	4.25 to 4.75
Cleveland	6.00 to 6.50
Detroit	5.00 to 5.50
Eastern Pa.	6.75
N. Y., deal.	2.00 to 2.50
Pittsburgh	8.75 to 9.25
St. Louis	3.00 to 3.50
Valleys	8.75 to 9.25

BORINGS AND TURNINGS
For Blast Furnace Use

Boston, dealers	2.00 to 2.50
Buffalo	6.50 to 7.00
Cinci., deal.	4.25 to 4.75
Cleveland	6.50 to 7.00
Detroit	5.75 to 6.25
Eastern Pa.	6.00
N. Y., deal.	2.00 to 2.50
Pittsburgh	7.50 to 8.00

CAST IRON BORINGS

Birming., chem.	8.50 to 9.50
Birming., plain	3.00 to 3.25
Boston, chem.	5.50 to 6.00
Boston, dealers	1.00 to 1.25
Buffalo	5.75 to 6.50
Chicago	5.50 to 6.00
Cinci., deal.	4.25 to 4.75
Cleveland	6.50 to 7.00
Detroit	5.75 to 6.25
Eastern Pa.	3.50 to 3.75
E. Pa., chem.	10.00 to 12.00
N. Y., deal.	2.50 to 3.00
Pittsburgh	7.75 to 8.25
St. Louis	3.50 to 4.00

PIPE AND FLUES

Cinci., deal.	4.00 to 4.50

RAILROAD GRATE BARS

Buffalo	5.00 to 5.50
Chicago, net	7.50 to 8.00
Cincinnati	4.50 to 5.00
Eastern Pa.	7.00 to 7.50
N. Y., deal.	4.00 to 4.50
St. Louis	6.00 to 6.50

FORGE FLASHINGS

Boston, dealers	3.50 to 4.00
Buffalo	8.25 to 8.75
Cleve. ov. 16 in.	8.25 to 8.50
Detroit	6.00 to 6.50

FORGE SCRAP

Boston, dealers	3.00 to 3.50
Chicago	10.00 to 10.50
Eastern Pa., del.	8.00 to 9.00

ARCH BARS, TRANSOMS

Chicago, net	8.00 to 8.50
St. Louis	8.50 to 9.00

AXLE TURNINGS

Boston, deal.	2.50 to 3.00
Buffalo	7.50 to 8.00
Chi., elec. fce	7.50 to 8.00
Cleveland	6.00 to 6.50
Eastern Pa., del.	7.50 to 8.50
St. Louis	4.00 to 4.50

STEEL CAR AXLES

Birmingham	9.00 to 9.50
Boston, ship. pt.	8.00 to 8.50
Buffalo	10.00 to 11.00
Chicago, net	11.00 to 11.50
Eastern Pa.	14.50
St. Louis	9.25 to 9.75

SHAFTING

Boston, ship. pt.	8.50 to 8.75
Eastern Pa.	13.50
N. Y., deal.	8.50 to 9.00
St. Louis	7.50 to 8.00

CAR WHEELS

Birming., iron	9.00 to 9.50
Boston, iron deal.	5.50 to 6.00
Buffalo, iron	8.00 to 9.00
Buffalo, steel	11.00 to 11.50
Chicago, iron	9.50 to 10.00
Chi., rolled steel	10.00 to 10.50
Cincinnati iron	7.25 to 7.75
E. Pa. iron	9.50 to 10.00
E. Pa. steel	11.00 to 11.50
Pitts., iron	11.00 to 11.50
Pitts., steel	13.00 to 13.50
St. Louis, iron	8.00 to 8.50
St. Louis, steel	9.50 to 10.00

NO. 1 CAST SCRAP

Birmingham	8.00 to 8.50
Boston, No. 2	3.75 to 4.00
Boston, textile	7.50 to 8.00
Buffalo, cupola	9.50 to 10.00
Buffalo (mach.)	10.00 to 11.00
Chicago, agri. net	8.00 to 8.50
Chi., mach. net	8.50 to 9.00
Chi., railroad net	8.50 to 9.00
Cinci., mach. cup.	7.75 to 8.25
Cleve. cupola	8.50 to 9.50
Detroit, net	8.50 to 9.00
E. Pa. cupola	10.00 to 11.00
N. Y., cup. deal.	6.00 to 6.50
N. Y., del. local foundries	9.00 to 9.50
Pitts., cupola	10.00 to 11.00
San Fran., del.	13.50 to 14.00
Seattle	4.50 to 6.50
St. Louis, No. 1	8.25 to 8.75
St. L. No. 1 mach.	7.75 to 8.25

HEAVY CAST

Boston, del.	4.25 to 4.50
Bost., mach. cast	7.00 to 7.50
Buffalo, break	7.00 to 7.50
Cleve., break	6.50 to 7.00
Detroit, auto net	9.00 to 9.50
Detroit, break.	6.50 to 7.00
Eastern Pa.	9.50 to 10.00
N. Y. No. 1, deal.	6.00
N. Y. break, deal.	5.50 to 5.75
Pittsburgh	9.00 to 9.50

MALLEABLE

Boston, consum.	9.50 to 10.00
Buffalo	11.50 to 12.00
Chicago, R. R.	10.50 to 11.00
Cinci., agri. del.	8.00 to 8.50
Cinci., R. R. del.	8.75 to 9.25
Cleveland, rail	10.00 to 10.50
Detroit, auto	7.50 to 8.00
St. Louis R. R.	8.50 to 9.00

RAILS FOR ROLLING
5 feet and over

Birmingham	8.50 to 9.50
Boston, deal.	5.00 to 5.50
Buffalo	8.75 to 9.25
Chicago	10.00 to 10.50
Eastern Pa.	10.00 to 11.00
New York dealer	5.50 to 6.00
St. Louis	10.00 to 10.50

LOCOMOTIVE TIRES

Chicago, cut	9.50 to 10.00
St. L., No. 1	7.50 to 8.00

LOW PHOS. PUNCHINGS

Buffalo	10.50 to 11.50
Chicago	10.00 to 10.50
Eastern Pa.	10.00
Pittsburgh	13.25 to 13.75

to week of July 10 closing on scrap lists usually handled earlier. This is because of annual meeting of Institute of Scrap Iron and Steel Inc.

Cleveland—Arrival last week of five lake cargoes of scrap continued the oppressive influence on the local market. Prices are stronger and have been advanced 50 cents per ton on several grades. Local supply appears insufficient for needs of mills here.

Chicago—Scrap prices continue to strengthen and although mills have made no purchases recently quotations are higher on figures prevailing on buying by dealers. Heavy melting steel generally is not available at less than $9 and some dealers are offering $9.25 and higher. This indicates a market range for this grade of $9 to $9.50, pending appearance of mill sales. Foundry and other small scrap consumers are more active and prices on a number of grades are up 50 cents. Supplies are scarce at the current market and railroads are selling only small lots.

Boston—Scrap prices are firm on a fair volume of buying. No. 1 heavy melting steel is being taken at $7.25, Worcester, Mass., and $5.75, f.o.b., for Pittsburgh shipment.

Philadelphia—While not reflected in general advances, consuming pressure for scrap is strong. Largest buying includes several thousand tons of No. 1 melting steel for Coatesville, Pa., at $9.50, delivered.

New York—Heavy melting steel has advanced 50 cents, dealers paying $6 to $6.50 for No. 1, the higher quotation for barge loading. Better than $6.50 has been paid in a few instances. No. 2 steel is now $5 to $5.50, shipping point. Other grades are strong and some higher, including steel shafting and skeleton.

Buffalo—The market is firm, with mills refraining from extensive buying. Operations are being extended and dealers believe buying is near. Dealers are now quoting $11 for No. 1 and $10 for No. 2 heavy melting steel.

Detroit—The market on iron and steel scrap continues strong and the undercurrent is that marked advances in price may be expected soon. Ford Motor Co. has sold its accumulation to Bethlehem Steel Co., which is now being moved by water to Buffalo. With the Chrysler stock sold several months ago, the two large accumulations are off the market. A slightly easier automobile production situation probably will prevail during the summer, but a strong fall is in prospect. Price changes this week include 50 cent advances in No. 1 steel and compressed sheets and $1 in forge flashings.

Cincinnati—Mill buying of iron and steel scrap is light although shipments against orders are up slightly on higher melting rates. The foundation of the market is considered strong, with dealers wary of short sales.

St. Louis—With continued brisk purchasing of small quantities and willingness of melters to take tonnages if terms could be reached, iron and steel scrap is stronger. Dealers experience more difficulty in buying to cover contracts.

Birmingham, Ala.—Heavy melting steel, No. 1 cast and some other grades are moving actively. Prices are strong.

Toronto, Ont.—Business in the old material markets shows little change but iron and steel markets are developing a better undertone. The only activity in steel scrap is for export. Iron grades show minor improvement. Odd lot sales are being made in stove plate and malleable and other grades are spotty. Prices are unchanged.

Ore Shipments This Year Over Five Times Last Year's

Iron Ore Prices, Page 52

Cleveland—Lake Superior iron ore shipments for June amounted to approximately 1,200,000 tons, according to an estimate by the Lake Superior Iron Ore association, based on figures reported for the first three weeks. The total for May was 900,000 tons; and for June, 1932, it was 233,000 tons. The movement this year to July 1 was approximately 2,100,000 tons, compared with 388,000 tons in the same period last year. If the same ratio of gain continues for the remainder of the year the total will exceed 18,000,000 tons.

Refractory Sales Heavy

Refractories Prices, Page 52

Pittsburgh—Specifications for fire clay, silica, magnesite and chrome refractory bricks are being accepted through July by sellers at the June price. June shipments were the best in many years. Several large blast furnace relining contracts were placed here within the past ten days.

Equipment

Increase in Inquiry Augurs Early Buying Programs

Pittsburgh—Mill equipment buying still is featured by heavy orders for rolls. Inquiries are noted for changes involving several stands of new rolling mills and two inquiries from the Valley district are reported active and ready to be placed at any time. A West Virginia mill is also inquiring for some equipment involving several stands. Reconditioning of open hearths and preparation

CENTRAL-*IZE* . . .
. . . . for quality

Laboratory Guidance
plus
Mechanical Control
plus
Expert Supervision
= "CENTRAL" QUALITY STEEL

Billets - Plates - Sheets - Flanged and Dished Heads - Floor Plates - Stampings
IN STANDARD AND SPECIAL ANALYSES

CENTRAL IRON & STEEL COMPANY
HARRISBURG, PA.

for blast on several formerly inactive blast furnaces in this district has called for a large number of repair parts.

New York—Orders are light and scattered, but inquiry is slightly heavier, presaging more actual buying in the fall should improved industrial conditions continue. A Reading, Pa., plant has placed six lathes with a mid-west builder while a Pottstown, Pa. shop has also placed equipment.

Chicago—Equipment markets more fully reflect the general improvement in industrial operations, and sales and inquiries gradually are increasing. This demand is more noticeable in small tools and spare parts than in larger equipment, with recent sales of such items as saws, drills, etc., improved considerably over the volume early in the year. Inquiry for used tools is fairly active. Railroads in this district are making few inquiries for equipment, recent purchases having been confined principally to various raw materials. Some government purchases are noted, including machinery to be used in the building of the Oakland-San Francisco bridge. Inquiry is expected soon from Inland Steel Co. for new maintenance shop equipment.

Harnischfeger Corp., Milwaukee, has received an order from the Inland Steel Co. for two overhead cranes, each with 100-foot span, to be installed in its new tin plate mill at Indiana Harbor. The order is valued at $26,000.

Boston—More equipment is being figured with some fair business placed with New England machine builders. While volume has not improved to what might be termed near normal with most plants, there has been a general gain in shop schedules. A central Massachusetts builder of steel mill equipment is figuring more business, while business has improved on special equipment applicable to present installations to effect greater efficiency and economy. There is some export inquiry out for grinding machinery and a Worcester, Mass., shop has sold equipment to an agricultural implement plant.

Personals

(*Concluded from Page* 19)

elected president of the American Institute of Electrical Engineers for the year beginning Aug. 1.

□ □ □

H. A. Brassert, of H. A. Brassert & Co., Chicago, who has spent the last two months in England in connection with the design and erection of the new steel plant of Stewarts & Lloyds, at Corby, Northampton, was expected to sail for home the latter part of June.

□ □ □

C. E. Reed has been appointed field sales manager for the Chicago Pneumatic Tool Co., New York, with headquarters in Wichita, Kans.

□ □ □

E. B. Cleborne, president, Wallingford Steel Co., Wallingford, Conn., was recently elected a director of Ludlum Steel Co., Watervliet, N. Y.

□ □ □

Ray S. Fox, in charge of pig iron sales at the Cleveland-Cliffs Iron Co., Cleveland, representing the merchant pig iron department of Otis Steel Co., has resigned. He has been engaged in iron and steel sales work for 30 years, for the last 15 years with the Cleveland-Cliffs company.

□ □ □

Arthur W. Thompson has been appointed sales manager of the Red Top Steel Post Co., Chicago, succeeding Luther H. Atkinson, who recently became general sales manager of the Wood Conversion Co., Cloquet, Minn. Mr. Thompson has been associated with the Red Top company ten years, being assistant sales manager since 1927.

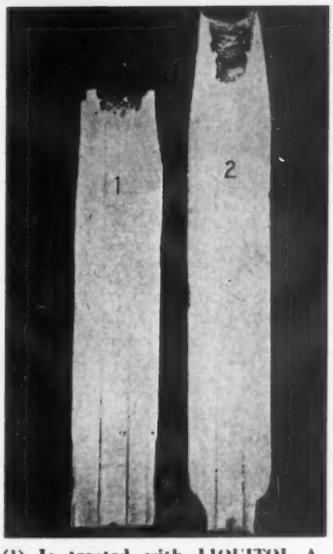
□ □ □

H. L. Edinger, Darnett Foundry & Machine Co., Irvington, N. J., has been elected president of the New Jersey Foundrymen's association. P. R. Van Duine, Meeker Foundry Co., Newark, N. J., has been elected vice president; J. A. Williamson, Isbell-Porter Co., Newark, treasurer; and G. W. Hanay, Barnett Foundry & Machine Co., Irvington, secretary. The next meeting of the association is scheduled for Oct. 25.

□ □ □

F. A. Hausman, former head of the Hausman-Harwick Machine Tool Co., Birmingham, Ala., has joined with James L. McVoy to form the McVoy-Hausman Co., sales agents, with headquarters in the Brown-Marx Building, Birmingham. Among the accounts they will handle are: Bliss & Laughlin Inc., Harvey, Ill., manufacturer of cold finished steel bars; Productive Equipment Co., Chicago, manufacturer of vibrating screens; Foundry Equipment Co., Cleveland Worm & Gear Co., Cleveland, and American Monorail Co., Cleveland.

Let LIQUITOL Reduce YOUR INGOT COSTS



(1) Is treated with LIQUITOL A SPECIAL, the fluid metal is only poured to half of the head. The formation of the hole is such that the ingot is quitesolid. The savings in 16 of these ingots is 1 ingot. This is only used for refined steel, that is to say, tool steel, cutting steel, and special steels of high quality.

LIQUITOL retards Cooling of hot-top metal.

Working on the theory that secondary piping is caused by occluded gases, it follows that if the hot-top is kept open longer gases have a better chance to escape.

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LIQUITOL prevents bridging of hot-top metal, allowing a natural feed of metal down the hot-top sides.

THE ALPHA-LUX COMPANY, INC.

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NEW YORK CITY

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Warehouse

June Sales Best for Years; Price Changes Await Mills

Pittsburgh—Heavy bookings of bars, plates and shapes from warehouse accounted for June doubling May volume and tripling that of April. Warehouse sales went through last week on the usual day-to-day basis for prices, which were unchanged.

Present mill prices on bars, plates and shapes are being extended into early July, at least.

Cleveland—The volume of June business was larger than that of May, but the gain did not equal that of May over April. Demand is principally for light bars and sheets. Prices are expected to remain unchanged until the steel industry's code is adopted and wages and mill prices are determined.

Chicago—Sales continue steady and June business showed a gain over May. Expectations are for considerably less than the usual decline in sales during July. Price changes await clarification of mill quotations. Quantity differentials ranging from 50 per cent off on orders of less than 100 pounds, to 70 off on lots of 1000 pounds and over have been announced on bolts and nuts.

Boston—A few of the larger warehouse accounts are furnishing most current orders. Aggregate volume, however, holds up and buying is well spread. Mills are covering warehouse buyers through July on most prodnounced for application on bolts and nuts.

St. Louis—Preliminary reports indicate June business of iron and steel warehouses will exceed May, which was the largest this year. Demand is more diverse, with railroads fairly liberal buyers.

Philadelphia — Warehouse prices are unchanged, with volume for July expected to show little drop from June, which for most jobbers was the best he has experienced so far this year.

Cincinnati—Warehouse business here in June showed a 25 per cent gain over May, with no indications of the usual seasonal mid-summer recession.

Ferromanganese Advances

New York — A sharp advance in ferromanganese for the third quarter was to be announced July 1, probably effective only for the third quarter. Producers of domestic spiegeleisen are expected to advance spot prices shortly.

Warehouse Quotations at Leading Centers, in Cents Per Pound

(All Philadelphia prices subject to quantity differentials except reinforcing and Swedish bars)

STEEL BARS □

Baltimore*	2.35c
Boston††	2.50c
Buffalo	2.95c
Chattanooga	3.00c
Chicago	2.75c
Cincinnati	3.00c
Cleveland	2.75c
Detroit	2.85c
Houston	2.40c
Los Ang.	3.30c
New Orleans	2.50c
New York‡(d)	3.10c
Philadelphia	2.45c
Pittsburgh	2.50c-2.60c
Portland	3.00c
San Fran.	3.15c
Seattle	3.00c
St. Louis	3.00c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS □

Baltimore	2.35c
Boston††	2.70c
Chattanooga	3.00c
Chicago	2.75c
Cincinnati	3.00c
Detroit	2.85c
New York‡(d)	3.10c
Philadelphia	2.45c
St. Louis	3.00c
Tulsa	3.25c

REINFORC. BARS □

Baltimore	2.35c-3.00c
Boston	3.10c-3.25c
Buffalo	2.95c
Chattanooga	3.00c
Cincinnati	3.00c
Cleveland	2.00c-2.45c
Detroit	2.85c
Houston	3.00c
Los Ang. cl.	2.10c
New Orleans	2.75c
Los Ang., lcl	2.40c
New York	2.65c-3.10c
Phila.	2.62½c
Pittsburgh	2.50c-2.60c
San Fran. cl.	2.00c
San Fran. lcl	2.40c
Seattle	3.00c
St. Louis	3.15c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES □

Baltimore*	2.35c
Boston††	2.60c
Buffalo	3.20c
Chattanooga	3.20c
Chicago	3.00c
Cincinnati	3.25c
Cleveland	2.95c
Detroit	3.10c
Houston	2.65c
Los Ang.	3.30c
New Orleans	3.50c
New York(d)	3.10c
Philadelphia	2.45c
Pittsburgh	2.85c
Portland	3.35c
San Fran.	3.15c
Seattle	3.00c
St. Louis	3.25c
St. Paul	3.25c
Tulsa	3.50c

PLATES □

Baltimore*	2.35c
Boston††	2.60c
Buffalo	3.20c
Chattanooga	3.20c
Chicago	3.00c
Cincinnati	3.25c
Cleveland, ¼-in. and thicker	2.95c
Cleve., 3/16-in.	3.20c
Detroit	3.10c
Det., 3/16-in.	3.10c
Houston	3.00c
Los Angeles	3.30c
New Orleans	3.50c
New York(d)	3.30c
Philadelphia	2.45c
Phila. floor	5.10c
Pittsburgh	2.85c
Portland	3.35c
San Fran.	3.15c
Seattle	3.00c
St. Louis	3.25c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE □

Baltimore*	2.60c
Boston††	2.35c
Buffalo	3.10c
Chattanooga	3.44c
Chicago	2.75c
Cincinnati	3.05c
Cleveland	2.75c
Det., 8-10 ga.	2.90c
Houston	3.35c
Los Ang.	3.80c
New Orleans	3.25c
New York	2.75c
Portland	4.00c
Pitts.**	2.60c
San Fran.	3.75c
Seattle	3.50c
St. Louis	3.00c-3.15c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK □

Balt.*†	3.25c
Boston††	3.45c
Buffalo	3.25c
Chattanooga	3.50c
Chicago	3.45c
Cincinnati	3.60c
Cleveland	3.25c
Detroit	3.30c
Los Ang.	4.20c
New York	3.25c
Pitts.**	3.35c
Portland	4.50c
San Fran.	3.70c
Seattle	4.25c
St. Louis	3.60c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS □

Balt.*†	3.75c
Buffalo	3.75c
Boston††	4.00c
Chattanooga	3.95c
Chicago	3.75c-3.85c
Cincinnati	4.00c
Cleveland	3.50c
Detroit	3.50c
Houston	3.57c
Los Ang.	4.50c
New Orleans	3.95c
New York	3.50c
Pitts.**	3.60c-3.85c
Portland	5.00c
San Fran.	4.30c
Seattle	4.75c
St. Louis	3.75c
St. Paul	4.19c
Tulsa	5.10c

†BANDS □

Baltimore	2.65c
Boston††	3.00c
Buffalo	3.30c
Chattanooga	3.20c
Chicago	2.95c
Cincinnati	3.20c
Cleveland	3.00c
Det. 3/16-in. & lighter	3.15c
Houston	2.85c
Los Ang.	3.30c
New Orleans	2.75c
New York(d)	3.30c
Philadelphia	2.75c
Pittsburgh	2.95c
Portland	3.85c
San Fran.	3.15c
Seattle	3.50c
St. Paul	3.20c
Tulsa	3.45c
St. Louis	3.20c

†HOOPS □

Baltimore	2.65c
Boston	4.90c
Buffalo	3.55c
Chicago	3.50c
Cincinnati	3.75c
Det. No. 14 & lighter	3.65c
New York	3.30c
Philadelphia	3.00c
Pittsburgh	3.60c
Seattle	5.00c
St. Paul	3.75c

COLD FIN. STEEL □

Baltimore (c)	3.33c
Boston	3.60c
Buffalo	3.00c
Chattanooga*	3.65c
Chicago	3.00c
Cincinnati	3.32c
Cleveland	2.95c
Detroit	3.15c
Los Ang.	5.50c
New Orleans	4.25c
Philadelphia	3.35c
Pittsburgh	2.95c
Portland (f)	4.50c
San Fran.(d)	5.50c
Seattle (f)	4.50c
St. Paul	3.20c
St. Louis	3.36c
Tulsa	4.65c

COLD ROLL. STRIP □

Boston 0.100 in., 500 lb. lots	5.20c
Buffalo	5.25c
Chicago (b)	5.65c
Cincinnati	5.80c
Cleve. (b)	5.55c
Detroit	5.40c
Phila. (c)	4.55c
New York	4.55c

(a) Rounds, hex. only.
(b) Net base straightening, cutting, boxing 1 ton or more.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) Bessemer analysis extras included.

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.
†New extras apply.
††Base 40,000 lbs., extras on less.

Prices at Detroit, Cleveland, New York, Chicago, Pittsburgh, Cincinnati, Chattanooga and St. Louis on heavier lines are subject to new quantity differentials: 399 pounds and less, up 50c; 400 to 999 pounds, base; 1000 to 4999 pounds, 20c off; 5000 to 9999 pounds, 40c off; 10,000 to 39,999 pounds, 60c off; 40,000 pounds and over, 75c off.

Pacific Coast

Los Angeles Transmission Towers, Taking 30,000 Tons of Shapes, Up for Bids—Market Generally Dull—Seattle Gets No Bids on Seawall Project—Some Prices Are Higher

San Francisco—(*By Air Mail*)—Pacific Coast Steel Corp. has booked 145 tons of reinforcing bars for a bridge over the Stanislaus river, California, reported as going to unnamed interests several weeks ago. Bids were opened June 26 for 378 tons for bridges and highway work in ten counties in Colorado. Prices in the San Francisco district have firmed up to 2.05c, base and at 2.35c, base on l.c.l. shipments.

Plate business is limited to small lots. Bids are expected to be called for shortly for 6000 tons for the Pine Canyon dam pipeline, Pasadena, Calif. Prices are general at 1.75c, c.i.f., but an advance is looked for shortly.

Bids will be opened July 14 for the second largest structural project to come up for figures on the Pacific Coast this year. Close to 30,000 tons for transmission towers for the city of Los Angeles are involved. Bids have been opened on 600 tons, including 100 tons of galvanized sheets, for the Key System Ltd. terminal on the waterfront in Oakland, Calif. New inquiries include 269 tons for bridges in Colorado for the state. Plain standard shapes hold at 2.10c, c.i.f., with wide flange material quoted at 2.20c.

San Francisco has just opened bids on 1595 tons of 6 and 8-inch cast iron pipe. Los Angeles will open bids next week on 7800 tons of 6 to 12-inch pipe.

Bolt and nut prices have been advanced and 73 off list appears to be general. One mill representative reports booking over ten carloads within the past few days.

No Seattle Seawall Bids

Seattle—Iron and steel prices are firm in the Pacific Northwest. The trade is anticipating higher mill schedules, which will be reflected in warehouse and other quotations. In the meantime agencies are accepting no forward business except subject to confirmation or to a change at the turn of the half year.

No bids were received by Seattle for the $1,200,000 seawall project, involving 6215 tons of steel sheet piling, reinforcing steel and cast iron pipe. Financial arrangements were believed satisfactory but contractors were unable to obtain protection on prices for a job that will require months to complete.

Northwest Steel Rolling Mills, Seattle, has booked 100 tons of reinforcing for the Snoqualmie Pass, Wash., paving job. After long delay bureau of roads has awarded Interstate Engineering & Construction Co., Newport, Wash., the contract to build a bridge across Slate creek, Pend Oreille county, Wash., involving 123 tons of structurals and 24 tons of reinforcing. Idaho road commission July 7 at Boise, Idaho, will receive bids for two bridges involving 190 tons of reinforcing and miscellaneous steel. Bureau of roads will open tenders July 6 at Portland, Oreg., for building a steel I-beam stringer bridge, Marion county, Oreg., requiring 155 tons of shapes and 14 tons of reinforcing.

Cast iron pipe agencies report much business expected to develop in the near future. Inquiries are increasing and the outlook is promising.

Steel in Europe

British Improvement Grows; Continent Awaits Prices

London — (*By Cable*) — Further small improvement in sales of steel products has appeared and plant expansion is expected soon. Inquiries are broadening, including those for forward business. The Scottish home market in sheets is improving and galvanized sheet prices have been advanced. Trade in black sheets is expanding, while galvanized sheets remain dull. Domestic trade in the Midlands has improved, owing to cessation of Continental competition. Exports of tin plate are much better.

Continental export markets are calm and there is much uncertainty while the comptoirs are negotiating fixed c.i.f. prices. French and German domestic markets show more activity.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, June 29

Export Prices f.o.b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports	£ s d	Continental Channel or North Sea ports, metric tons Gold parity, $4.8665	£ s d	£ s d
PIG IRON					
Foundry, 2.50-3.00 Silicon	$12.67	2 18 6	$8.27		1 14 0
Basic bessemer	11.69	2 14 0*	7.30		1 10 0
Hematite, Phos. .03-.05	12.77	2 19 0	.....		.....
SEMIFINISHED STEEL					
Billets	$21.65	5 0 0	$11.44		2 7 0
Wire rods, No. 5 gage	32.48	7 10 0	21.90		4 10 0
FINISHED STEEL					
Standard rails	$33.56	7 15 0	$26.77		5 10 0
Merchant bars	1.25c	6 10 0	.66c		3 0 0
Structural shapes	1.42c	7 7 6	.61c		2 15 0
Plates, †¼ in. or 5 mm	1.59c	8 5 0	.86c		3 18 6
Sheets, black, 24 gage or 0.5 mm.	1.74c	9 0 0	1.29c		5 17 6
Sheets, gal., 24 gage, corr.	2.12c	11 0 0	1.54c		7 0 0
Bands and strips	1.50c	7 15 0	.80c		3 12 6
Plain wire, base	1.69c	8 15 0	1.18c		5 7 6
Galvanized wire, base	2.03c	10 10 0	1.38c to 1.40c		6 5 6 to 6 7 6
Wire nails, base	2.32c	12 0 0	1.27c		5 15 0
Tin plate, box 108 lbs.	$ 3.73	0 17 3	.....		.....

British ferromanganese $68 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

		£ s d	French Francs		Belgian Francs		Reich Marks	
Fdy. pig iron, Si. 2.5	$13.53	3 2 6a	$10.06	200	$10.35	290	$19.15	63
Basic bessemer pig iron	12.77	2 19 0*	9.56	190	8.21	230	21.13	69.50
Furnace coke	2.87	0 13 3	6.04	120	3.93	110	5.85	19.25
Billets	21.65	5 0 0	20.37	405	14.82	415	29.34	96.50
Standard rails	1.59c	8 5 0	1.64c	697	1.76c	1,100b	1.82	132
Merchant bars	1.30c	6 15 0	1.29c	560	.86c	535	1.52c	110
Structural shapes	1.69c	8 15 0	1.27c	550	.86c	535	1.48c	107.50
Plates, †¼-in. or 5 mm	1.64c	8 10 0	1.56c	680	1.08c	675	1.75c	127
Sheets, black	1.88c	9 15 0§	1.96c	850‡	1.12c	700‡	1.99c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	2.32c	12 0 0	3.34c	1,450	2.32c	1,450	5.11c	370
Plain wire	1.69c	8 15 0	2.60c	1,130	2.08c	1,300	2.44c	177
Bands and strips	1.83c	9 10 0	1.33c	580	1.08c	675	1.75c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price.
British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel.
a del. Middlesbrough. b Since January

Nonferrous Mill Products

Base price cents per pound f.o.b. mill except otherwise specified. Copper and brass product prices based on 8.00c, Conn., for copper

Sheets	
Yellow brass (high)	13.25
Copper, hot rolled	15.62½
Lead sheets, cut to jobbers	7.75
Zinc sheets (100-lb. base)	9.00
Tubes and Pipes	
Seamless yellow brass (high)	14.87½
Seamless copper	15.12½
Rods	
Yellow brass (high, full turning)	10.75
Naval brass	11.87½
Anodes	
Copper, untrimmed	13.00
Wire	
Yellow brass (high)	13.25

Old Metals

Dealers' buying prices, cents lb

No. 1 Composition Red Brass	
New York	4.00 to 4.25
Chicago	4.25 to 4.50
Cleveland	5.00 to 5.50
St. Louis	4.00 to 4.25
Heavy Yellow Brass	
New York	3.00 to 3.25
Heavy Copper and Wire	
New York	5.75 to 5.87½
Chicago, No. 1	5.50 to 5.75
Cleveland	5.00 to 5.50
St. Louis	4.75 to 5.00
Composition Brass Borings	
New York	3.50 to 3.75
Yellow Brass Tubing	
Cleveland	3.25 to 3.75
Light Copper	
New York	4.50 to 4.62½
Chicago	4.25 to 4.50
Cleveland	4.50 to 5.00
St. Louis	4.25 to 4.50
Light Brass	
Chicago	2.75 to 3.00
Cleveland	2.75 to 3.25
St. Louis	2.50 to 3.00
Lead	
New York	2.87½ to 3.12½
Cleveland	2.75 to 3.25
Chicago	2.50 to 2.75
St. Louis	2.75 to 3.00
Zinc	
New York	2.00 to 2.12½
Cleveland	2.00 to 2.25
Chicago	2.00 to 2.25
St. Louis	2.00 to 2.25
Aluminum	
Clippings, new, soft, Cleve.	13.00 to 14.50
Clippings, hard, Cleveland	8.00 to 10.00
Borings, Cleveland	5.00 to 5.50
Mixed cast, Cleveland	7.00 to 7.50
Mixed cast, St. Louis	6.50 to 7.00

Secondary Metals

Brass ingot, 85-5-5-5	8.00
Remelt aluminum No. 12	12.00 to 12.50

Metals

Most Metals Steady but Zinc Moves Higher and Tin Market Is Erratic—Copper Is Firmer

New York—Zinc gained further strength last week and tin fluctuated widely on erratic movement of exchange rates on the pound sterling but other metals, including copper, lead, antimony, aluminum and nickel held steady. Nonferrous metal producers are reported working on code under the industrial recovery program but none have been completed as yet.

Copper—A stronger and more active market abroad supported the domestic situation. Consumers came into the market for larger tonnages in this country but buying could not be termed active. Custom smelters and producers held electrolytic metal firmly at 8.00c, Connecticut base. Metal which had been available from resellers at concessions largely disappeared. Copper and brass products held steady and unchanged. Operations continued at an active pace. Brass ingot was in only fair demand but prices were firm with 85-5-5-5 grade quoted 8.00c. Red metal scrap was slightly freer.

Lead—Demand continued fairly active with leading sellers generally experiencing no difficulty in balancing sales with ore intake. Bulk of the business was for July shipment but some sales also were made for August. Corroders were the most active in the market and cable makers the least. Prices were firm.

Zinc—An improved buying movement developed which resulted in generally higher prices. The prospects for a further advance in ore, which already is quoted $30 a ton, against a 1932 low of $14, also supported the market. Many sellers were reluctant to take business at quoted levels or were out of the market.

Tin—While some fair trading was reported in tin, business on some days was extremely difficult due to the sharp fluctuations in sterling exchange, with which tin prices are closely allied. Sterling jumped to about $4.43 but later fell to around $4.25 as reports from the London Economic conference developed to the effect that the United States may agree to stabilization of the dollar. Straits metal jumped to 45.50c Wednesday but eased to below 45.00c toward the close of the week.

Antimony—Prices were firm and trading quiet.

Alumium—Remelt grades showed increasing firmness. Virgin held unchanged.

By-products Are Active

New York—Supplies of toluol and xylol are not heavy enough to enable distributors to take all spot business available. Benzol is active; naphthalene spot demand is fair. Sulphate of ammonia price is unchanged for July at $21.50, port.

Coke By-Products

Per Gallon Producers' Plants, Tank Lots	**Spot**
Pure benzol	$0.22
90 per cent benzol	0.22
Toluol	0.30
Solvent naphtha	0.26
Commercial xylol	0.26
Per Pound at Producers' Plants in 250-Pound Drums	
Phenol	0.153 to 0.173
Per Pound at Producers' Plants	
Naphthalene flakes	4.75 to 5.75
Naphthalene balls	4.75 to 5.75
Per 100 Pounds Atlantic Seaboard	
Sulphate of ammonia	$1.15

Quicksilver Is Active

New York—Sales of quicksilver have been only lightly active this week, with prices quotably unchanged. Round lots vary from $60 to $61 a virgin flask of 76 pounds and small lots $61.50, with some prices ranging to $62 a flask.

Nonferrous Metal Prices of the Week, Cents a Pound

Spot unless otherwise specified

	Copper			Straits Tin		Lead	Lead	Zinc	Aluminum	Antimony	Ingot
	Electro., del. Conn.	Lake, del. Midwest	Casting, refinery	New York Spot	New York Futures	N. Y.	East St. L.	St. L.	98-99%	Spot, N. Y.	Nickel
June 24	8.00	8.12½	7.75	44.50	44.70	4.20	4.05	4.35	*22.90	6.50	35.00
June 26	8.00	8.12½	7.75	45.37½	45.62½	4.20	4.05	4.35	*22.90	6.50	35.00
June 27	8.00	8.12½	7.75	45.87½	45.95	4.20	4.05	4.40	*22.90	6.50	35.00
June 28	8.00	8.12½	7.75	46.50	46.60	4.20	4.05	4.40	*22.90	6.50	35.00
June 29	8.00	8.12½	7.75	45.00	45.10	3.20	4.05	4.50	*22.90	6.50	35.00
June 30	8.00	8.12½	7.75	44.87½	44.95	4.20	4.05	4.50	*22.90	6.50	35.00

*Nominal quotation. Market range 19.90c to 22.90c.

Here and There in Industry

BRYANT HEATER & MFG. CO., Cleveland, has been purchased by the S. R. Dresser Mfg. Co., Bradford, Pa. The latter has been identified for 50 years with the gas industry through manufacture of pipeline accessories and by this purchase adds the Bryant line of house-heating equipment and methods. F. A. Miller, chairman, and H. N. Mallon, president, of the Dresser company, will occupy similar positions with the Bryant company. L. C. Harvey, sales manager for Dresser, will become vice president in charge of Bryant sales. E. P. Bailey Jr. returns to the Bryant company after an absence of three years and becomes vice president in charge of operations.

□ □ □

Columbia Steel Co., Torrance, Calif., has recalled its workers and is operating on a full week basis.

□ □ □

Reid-Avery Co., Philadelphia, manufacturer of welding rods and wire, has moved its offices to suite 1085 in the Broad Street Station building.

□ □ □

Dominion Bridge Co. Ltd., Lachine, Que., has recalled several hundred former employes at its main plant to care for increased business.

□ □ □

General Electric Co. has transferred production of electric irons to its plant at Ontario, Calif., according to announcement by E. H. Richardson, works manager.

□ □ □

Universal Power Corp., Cleveland, has appointed C. F. Camp Co., Tulsa, Okla., its mid-continent distributor for its arc-welding machines and welding equipment.

□ □ □

West Leechburg Steel Co., Pittsburgh, has made a 10 per cent wage increase, effective immediately, affecting 700 employes at its plant at Leechburg, Pa.

□ □ □

Steel & Tubes Inc., Cleveland, division of Republic Steel Corp., Youngstown, O., has been appointed sole sales agent for conduit pipe for Fretz-Moon Tube Co., Butler, Pa.

□ □ □

I. Levinstein & Sons have opened offices at 122 South Michigan avenue, Chicago, to engage in the sale of iron and steel scrap. Offices previously were located at East Moline, Ill.

□ □ □

Homestead Valve Mfg. Co., Coraopolis, Pa., has appointed the Clark-Wilcox Co., 790 Albany street, Boston, its exclusive sales representative in the New England states for its vapor spray machines for automotive, industrial and building cleaning.

□ □ □

Sundstrand Corp., Rockford, Ill., subsidiary of Underwood Elliott Fisher Co., Bridgeport, Conn., is moving its plant from Rockford to Bridgeport, where it will be merged with the parent company's works.

□ □ □

Vilter Mfg. Co., Milwaukee, has taken an order from the Prima Brewing Co., Chicago, for a 350-horsepower corliss-engined compressor to increase its refrigeration capacity from 350 to 550 tons.

□ □ □

Charles H. Besley & Co., Beloit, Wis., reports a general improvement in demand for grinders, taps, tools and other parts and has recalled some employes. J. B. Krebs is manager.

□ □ □

Pressed Steel Tank Co., Milwaukee, manufacturer of beer barrels and kegs, has recalled 150 men in the past 60 days and is employing 300 on full schedule on orders from more than 100 breweries.

□ □ □

Louis Allis Co., 427 East Stewart street, Milwaukee, has booked one of the largest orders it has taken in several years. It calls for more than 100 explosion-proof electric motors, with gear reducers and controls, totaling about $25,000. Demand for other lines of motors is also heavier and the company's payroll has been increased, working full time, with occasional overtime.

□ □ □

Ferro Enamel Corp., Cleveland, announces it will have a smelting plant in operation in France shortly, at Valenciennes, in charge of Maurice Delangre, who has been engaged in porcelain enameling for many years, and his family before him.

□ □ □

Kroeschell Engineering Co., Chicago, has been appointed resale dealer for all types and sizes of refrigeration compressors and vacuum refrigeration units manufactured by the Worthington Pump & Machinery Corp., Harrison, N. J., for the Chicago area.

□ □ □

Commercial Shearing & Stamping Co., Youngstown, O., employing about 600 men, has increased its wage rate about 10 per cent. The company has been operating day and night on government truck orders. George F. Alderdice is president.

□ □ □

Titan Metal Co., Bellefonte, Pa., manufacturer of brass products, has announced a 5 per cent increase in wages, effective June 15. Most departments now are operating two shifts. Incoming orders are reported largest in three years.

□ □ □

Inland Steel Co. has recalled 100 of its sheetmill employes formerly employed at its Milwaukee plant, to work in its plant at Indiana Harbor, Ind. No immediate hope is held of reopening the Milwaukee mill, closed more than a year ago.

□ □ □

Continental Supply Co., St. Louis, subsidiary of the Youngstown Sheet

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& Tube Co., Youngstown, O., will move its general offices to Dallas, Tex., about Sept. 1. It has leased three floors in the Crowdus building, Lane and Commerce streets. William J. Morris is president.

□ □ □

Chain Belt Co., Milwaukee, has received an order for 21 three-yard concrete mixers, one super-size mixer for a central plant and seven sets of belt conveyors for handling mineral aggregates, in connection with construction of the San Francisco-Oakland bridge.

□ □ □

Manitowoc Engineering Works, Manitowoc, Wis., manufacturer of cranes, shovels and draglines, has appointed Equipment Sales & Engineering Service, Milwaukee, its agent for Wisconsin. The latter has moved to larger quarters at 605 South Twelfth street.

□ □ □

Toledo Scale Co., Toledo, O., reports sales in may were 20 per cent heavier than in May, 1932. Industrial sales were 43 per cent above May, 1932. May showed a 60 per cent increase over April, which had been the best month since November, 1932.

□ □ □

Hartman Mfg. Co., Vincennes, Ind., owned by the Blount Plow Works, Evansville, Ind., will be moved to Evansville soon and consolidated with the latter's main works. Working force at Evansville will be practically doubled by this move.

□ □ □

General Electric Co., Schenectady, N. Y., announces a 5 per cent increase in wages and salaries from July 1. This will affect about 50,000 employes. One reduction of 10 per cent is the only one made by this company. Further curtailment was by short time employment.

□ □ □

A. P. Green Firebrick Co., Mexico, Mo., has formed a Canadian subsidiary, A. P. Green Co. of Canada Ltd., and has leased a plant at Atlantic and Hanna avenues, Toronto, Ont., for manufacturing purposes. Equipment will be bought immediately. J. W. Amis, Toronto, Ont., is president and W. A. Ward, Toronto, secretary.

□ □ □

Columbia Foundries, Columbia City, Ind., succeeding the Columbia Iron Works Co., which closed several years ago, will start operations in the plant of the former company as soon as the buildings are prepared and materials assembled. The foundry will mold iron, brass and aluminum.

□ □ □

Ritter Dental Co., Rochester, N. Y., has announced salary and wage increases for July 1, affecting 500 persons. Salaries will be advanced 6¼ per cent and hourly wages 10 per cent. This will restore nearly half the reduction from peak wages of 1929. Edwin L. Wayman is president.

□ □ □

Wisconsin Gray Iron Foundry Co. Milwaukee, will not rebuild at once its burned main foundry. It has leased a plant at 7225 West Main street, West Allis, Wis., owned by J. I. Case Co., Racine, Wis., and formerly used to produce a reserve supply of castings. Fifty workers have been recalled and others will be added as production is developed.

□ □ □

Claffey Casting Co. Inc., Waukesha, Wis., has been organized by B. D. Claffey and associates, who recently acquired the property of the former I. B. Rowell Co., Waukesha. The plant will be reopened as a jobbing foundry with 25 employes. The plant is being modernized and some equipment added. Light and medium gray iron and alloyed gray iron castings will be made in production and small lots.

□ □ □

Steelstamp Co., 3879 North Richards street, Milwaukee, finds its business 200 to 300 per cent above that of last year. An order for 2,000,000 sets of hinges and fasteners for beer cases has been booked and steel has been bought to produce 1,000,000 more. Some new presses have been installed. Parts for mops, toys, gasoline tank heads and other stamped parts are being received.

□ □ □

Millar-Jackman Inc., Pittsburgh, recently organized, will take over and expand the business conducted for ten years by the Industrial Products Corp., Pittsburgh. It will act as manufacturers' agent and jobber of industrial supplies and will make a specialty of reconditioning worn tools. Directors are W. E. Millar, David E. Jackman Jr., W. W. Millar, Norman B. Ward and W. G. A. Millar, all of Pittsburgh.

□ □ □

American MonoRail Co., manufacturer of material-handling equipment, Cleveland, has appointed the McVoy-Hausman Co., Birmingham,, Ala., its general agent for Alabama; D. S. Mair Machinery Corp., 505 Esperson building, Houston, Tex., agents for Texas; T. Spencer Williamson as manufacturer's agent, Mutual building, Richmond, Va., for Virginia; United Machinery Co., 289 East Salmon street, Portland, Oreg., for Oregon.

□ □ □

Kewanee Boiler Corp., Chicago, has ordered from the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., a carload of welding machines, including twelve 400-ampere welders, the largest type made for single operator work. The welders will be used in heavy tank and boiler construction recently undertaken by the Kewanee company. Treadwell Construction Co., Midland, Pa., has ordered four 400-ampere welders and William B. Scaife & Sons, Oakmont, Pa., has ordered three 300-ampere sets for tank manufacture. International Harvester Co., Chicago, has ordered one 1500-ampere, multiple-operation welder. Wicks Boiler Co., Saginaw, Mich., has ordered a three-operator, 750-ampere welder.

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Construction and Enterprise

New York

NEW YORK—Dayton Pressed Steel Corp. has been incorporated with $5000 capital to manufacture steel products, by John E. Wahlin, 7134 Sixty-ninth street, Glendale, L. I.

NEW YORK—Liberty Iron Works Inc. has been incorporated with $10,000 capital to manufacture boilers, pumps, tanks and valves, by Steinberg & Ehrlich, 285 Madison avenue, New York.

SCHENECTADY, N. Y.—Liberty Auto Body & Radiator Corp. has been incorporated with $10,000 capital, by Louis Caplan, 1006 Baker avenue, Schenectady, N. Y., and associates.

Pennsylvania

PITTSBURGH — Southwest Pipe Lines, Chamber of Commerce building, Pittsburg, plans to build a 6-inch pipeline across the Ohio river at Ben Avon, Pa.

PITTSBURGH — Pittsburgh Rolls Corp. has been given permission to assume title to the portion of Forty-first street adjoining its plant, the city council voing to vacate that portion of the street. Title will not pass for about 60 days. Following that the company will be ready to undertake enlargement of its plant, utilizing this space.

WEST SCRANTON, PA.—Finch Mfg. Co. plans construction of a shop and foundry to cost $70,000 or more.

Ohio

GALLIPOLIS, O.—Condee Coal Co. Gallipolis, O., plans construction of a coal-loading platform and incline on the Ohio river near Hartford, W. Va.

NEWCOMERSTOWN, O. — Pipe plant of James B. Clow & Sons suffered damage of $10,000 by fire recently.

Michigan

DETROIT—Automatic Fuel Supply Co., 2831 Brooklyn avenue, has been incorporated with $50,000 capital to manufacture fuel pumps, by Joseph H. Parsons, 2730 Union Guardian building, Detroit.

MUSKEGON, MICH.—West Michigan Steel Foundry Co. has taken over management of the Eagle Foundry & Machine Co.

Illinois

BLOOMINGTON, ILL. — Schultze Mfg. Co., 306 West Market street, has been incorporated with $3000 capital to manufacture power machinery and similar products, by L. K. Schultze and associates. Hall, Martin, Hoose & Depew, Bloomington, Ill., are correspondents.

CHICAGO—General Trains Inc., 318 Superior street, has been incorporated with $10,000 capital to manufacture electrical toy trains and similar products, by Pringle & Fearing, 111 West Washington street, Chicago.

CHICAGO—Continental Nipple Mfg. Co., 2860 North Paulina street, has been incorporated with $50,000 capital to manufacture valves, pipe, nipples and similar products, by Julius C. Greenbaum, room 322 Ashland block, Chicago.

Texas

BEAUMONT, TEX. — Production Specialty Co. has been formed by J. L. Stanley and Samuel Mullins to operate a machine shop and manufacturing business at 1494 Park street.

BROWNWOOD, TEX.—Harold Ford, Oklahoma City, Okla., has bought the Cranfill-Reynolds oil refinery here and plans improvements to place it in early operation.

DALLAS, TEX.—Welded Tank & Steel Co. has been incorporated with $18,000 capital to do steel fabrication, by Dee E. Humphrey and associates.

Wisconsin

FOOTVILLE, WIS.—Bids close July 7 for complete equipment for the new municipal pumping station.

MILWAUKEE—City council has accepted the proposition of Alvord, Burdick & Howson, consulting engineers, 20 North Wacker drive, Chicago, for services in connection with the proposed municipal filtration plant, estimated to cost $4,500,000, at a maximum fee of $73,500, to completion and satisfactory operation. J. P. Schwada is city engineer.

KENOSHA, WIS.—Wisconsin Oxygen & Hydrogen Co., 6313 Thirty-first avenue, has let a contract to J. C. Tully Co., 925 Fifty-ninth street, for construction of a boiler-room addition 30 x 35 feet.

MILWAUKEE—North Side Coal & Oil Co., 1016 East Chambers street, has let contract to Graver Corp., East Chicago, Ind., for four fuel oil storage tanks, each 32 feet in diameter and 43 feet high.

Iowa

COUNCIL BLUFFS, IOWA—Plant of Sprague Foundry & Mfg. Co., 230 South Eleventh street, suffered severe damage by fire recently, and will be rebuilt. Abe Katelman is general manager.

Pacific Coast

PORTLAND, OREG.—Rose City Brewery Inc. has been incorporated with $250,000 capital by Otto Berg and associates. A plant will be built at Bryant avenue and N. E. Eighth avenue, existing structures being remodeled to fit general plans. Carl Linde, Failing building, is architect and W. Caven Taylor, Studio building, is consulting engineer.

SEATTLE—J. C. Bowles Co. has been incorporated with $20,000 capital to manufacture plumbing supplies, by J. C. Bowles and C. N. Johnson.

SEATTLE—Century Brewing Association has been incorporated with $326,000 capital by R. E. Bronson and S. F. Ebbinghouse. A former brewing plant at 3100 Airport way is to be remodeled at cost of $100,000 on plans by Joseph Wohleb, architect, Olympia, Wash.

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ACETYLENE
Linde Air Products Co., 30 E. 42nd St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

ANNEALING BOXES
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.

ANODES (All Type)
Udylite Process Co., 3939 Bellevue Ave., Detroit, Mich.

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Morse Twist Drill & Machine Co., New Bedford, Mass.

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Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp. Youngstown, O.
Ryerson, Jos. T. & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.

BARRELS (Plating)
Udylite Process Co., 3939 Bellevue Ave., Detroit, Mich.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Co., Canton, O.

BARS (Concrete Reinforcing)
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEARINGS (Ball)
Bantam Ball Bearing Co., The, South Bend, Ind.

BEARINGS (Bronze)
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., 344-54 W. 6th St., Tarentum, Pa.

BEARINGS (Journal)
Bantam Ball Bearing Co., The, South Bend, Ind.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Bantam Ball Bearing Co., The, South Bend, Ind.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Bantam Ball Bearing Co., The, South Bend, Ind.
Timken Roller Bearing Co., The, Canton, O.

BENDING AND STRAIGHTENING MACHINES
Alliance Machine Co., The, Alliance, O.
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Logemann Bros. Co., 3126 Burleigh St., Milwaukee.
Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Construction Co., 1301 Koppers Bldg., Pittsburgh.
Youngstown Sheet & Tube Co., Youngstown, O.

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Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. La Salle St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Timken Steel & Tube Co., Canton, O.

BILLETS AND BLOOMS
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

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BLAST FURNACES—See FURNACES (Blast)

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BOILERS
Murray Iron Works Co., Burlington, Iowa.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.

BOLTS
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Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill. Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.
Ryerson, Jos. T., & Son, Inc. 16th and Rockwell Sts. Chicago Ill.

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American Bridge Co., Frick Bldg., Pittsburgh, Pa
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International-Stacey Corp., Columbus, O.
McClintic-Marshall Corp., Bethlehem, Pa.
Ohio Structural Steel Co., The, Newton Falls, O.
Truscon Steel Co., Youngstown, O.

BUCKETS (Clam Shell, Dragline, Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

STATISTICS OF IRON AND STEEL INDUSTRY

Compiled by department of commerce, except: Unfilled tonnage by United States Steel Corp.; foundry equipment orders by Foundry Equipment Manufacturers association; river traffic by United States engineer at Pittsburgh; electric power by department of interior, geological survey

Automobiles

Units Production

1932	—United States— Total*	Passenger cars	Canada Total
Jan.	119,344	98,706	3,731
Feb.	117,413	94,085	5,477
Mar.	118,959	99,325	8,318
April	148,326	120,906	6,810
May	184,295	151,683	8,221
June	183,106	160,103	7,112
July	109,143	94,678	7,472
Aug.	90,325	75,898	4,067
Sept.	84,150	64,735	2,342
Oct.	48,702	35,102	2,923
Nov.	59,557	47,293	2,204
Dec.	107,353	85,858	2,139
Year	1,370,678	1,134,372	60,816
1933			
Jan.	130,044	108,321	3,358
Feb.	106,825	91,340	3,298
March	117,949	99,225	6,632
April	180,667	152,939	8,255
May	218,171	184,578	9,396
5 Mo.	753,656	636,403	30,939

*Difference of total and passenger cars equals number of trucks. †Average monthly shipments, 1922-23-24 taken as 100.

Fabricated Shapes‡

Net Tons

1932	Bookings Tonnage	Per cent of capacity	Shipments Tonnage	Per cent of capacity
Jan.	48,400	12.1	65,600	16.4
Feb.	62,000	15.5	78,000	19.5
Mar.	64,400	16.1	82,400	20.6
April	64,800	16.2	68,400	17.1
May	90,800	22.7	72,400	18.1
June	86,800	21.7	83,200	20.8
July	69,200	17.3	83,600	20.9
Aug.	78,800	19.7	85, 00	21.4
Sept.	111,200	27.8	90,800	22.7
Oct.	74,400	18.6	86,400	21.6
Nov.	51,600	12.9	76,000	19.0
Dec.	145,600	36.4	68,800	17.2
Year	948,000	19.8	942,400	19.6
1933				
Jan.	73,679	....	50,965	....
Feb.	50,955	....	46,168	....
March	71,398	....	54,948	....
April	46,095	....	50,387	....
May	35,468	....	62,642	....
5 Mo.	277,595	....	265,110	....

‡Figures by American Institute of Steel Construction, from January, 1933, 75 per cent of industry reporting.

Fabricated Plates

Net Tons Bookings

1932	Total	Oil Storage Tanks	Miscellaneous
Jan.	17,613	4,783	12,124
Feb.	17,755	4,115	11,777
Mar.	12,564	1,161	10,022
April	14,074	1,406	11,167
May	11,788	2,310	9,356
June	18,383	2,808	10,209
July	12,485	3,661	6,586
Aug.	11,916	4,394	6,911
Sept.	11,013	3,753	6,801
Oct.	16,737	5,941	9,528
Nov.	7,873	1,446	6,065
Dec.	9,510	3,154	5,534
Year	161,810	38,976	109,085
1933			
Jan.	11,128	1,501	8,830
Feb.	16,588	8,347	7,660
March	8,903	1,270	6,787
April	9,502	2,938	6,291
May	16,243	2,858	8,183
5 Mo.	62,364	16,959	37,992

Railroad Locomotives

Units Shipments

1932	Domestic	Foreign
Jan.	..	..
Feb.	1	4
Mar.	..	3
April	8	..
May	13	2
June	17	..
July	9	..
Aug.	9	..
Sept.	9	4
Oct.	10	2
Nov.	8	..
Dec.	6	..
Year	80	15
1933		
Jan.	2	..
Feb.	7	..
March	2	..
April	1	..
May	1	..
5 Mo.	13	..

Foundry Equipment Order Index†

1932	
Jan.	20.5
Feb.	27.6
Mar.	27.5
April	13.7
May	18.0
June	14.2
July	18.7
Aug.	18.6
Sept.	11.9
Oct.	23.2
Nov.	11.5
Dec.	16.5
Year	....
1933	
Jan.	68.4
Feb.	16.1
March	9.8
April	19.4
May	25.6
5 Mo.	....

†Average monthly shipments, 1922-23-24 taken as 100.

Malleable Castings

Net Tons

1932	Output	Shipments	Orders booked
Jan.	20,399	19,658	20,332
Feb.	19,834	19,432	17,808
March	17,844	19,392	16,235
April	15,461	16,847	16,185
May	16,597	18,075	16,463
June	15,018	16,450	13,330
July	9,447	11,359	8,658
August	6,804	8,631	7,776
Sept.	10,051	9,746	10,582
Oct.	12,274	11,615	12,850
Nov.	13,622	12,745	14,304
Dec.	14,128	14,366	14,504
Year	171,479	178,316	169,027
1933			
Jan.	12,577	14,248	12,404
Feb.	13,575	14,068	11,077
March	9,756	10,967	12,380
April	17,871	16,666	17,856
May	24,628	23,077	24,671
5 Mo.	78,407	79,026	78,388

Steel Castings

Net Tons

1932	Total bookings	Total production
Jan.	17,393	18,395
Feb.	17,015	18,759
March	16,593	20,433
April	12,801	17,474
May	11,342	14,463
June	12,765	12,839
July	9,301	11,460
August	10,147	12,331
Sept.	11,883	11,337
Oct.	11,896	12,480
Nov.	13,235	13,712
Dec.	13,283	13,886
Year	155,837	175,831
1933		
Jan.	12,942	13,951
Feb.	11,857	12,438
March	11,458	13,209
April	14,507	12,071
May	20,755	18,991
5 Mo.	71,519	70,660

(a) by 40 plants. (b) by 30 manufacturers who produce for sale, including 5 who also report consumption of own metal.

Mechanical Stokers

—Sales—

1932	Fire tube boilers	Water tube boilers
Jan.	70	45
Feb.	63	26
March	60	23
April	80	15
May	41	30
June	65	48
July	70	44
August	99	38
Sept.	117	46
Oct.	96	21
Nov.	79	12
Dec.	78	20
Year	920	367
1933		
Jan.	50	13
Feb.	33	22
March	67	17
April	26	31
May	52	41
5 Mo.	228	124

Steel Furniture

Dollars, 000 omitted

1932	Business shipments	Shelving, shipments
Jan.	977	269
Feb.	807	229
March	780	259
April	753	190
May	653	196
June	671	177
July	521	155
August	543	141
Sept.	577	146
Oct.	622	142
Nov.	581	125
Dec.	610	135
Year	8,102	2,166
1933		
Jan.	582	121
Feb.	464	104
March	482	137
April	404	133
May	511	166
5 Mo.	2,445	664

Babbitt Metal

Pounds 000 omitted

1932	(a) Total production	(b) Sales
Jan.	1,743	1,281
Feb.	1,577	1,142
March	1,595	1,188
April	1,419	1,060
May	1,345	947
June	1,319	858
July	1,275	870
August	1,319	994
Sept.	1,406	1,103
Oct.	1,573	1,192
Nov.	1,265	944
Dec.	1,149	823
Year	16,990	12,412
1933		
Jan.	1,346	1,073
Feb.	1,117	917
March	1,134	941
April	1,544	1,270
May	2,110	1,785
5 Mo.	7,313	5,989

Unfilled Tonnage

Tons

1932	United States Steel Corp. Unfilled orders	Net change	Per cent change
Jan.	2,648,150	87,203—	3.19—
Feb.	2,545,629	102,521—	3.88—
March	2,472,413	73,216—	2.87—
April	2,326,926	145,487—	5.88—
May	2,177,162	149,764—	6.44—
June	2,034,768	142,394—	6.54—
July	1,966,302	68,466—	3.36—
Aug.	1,969,595	3,293+	0.16+
Sept.	1,985,090	15,495+	0.78+
Oct.	1,977,040	11,950+	0.62+
Nov.	1,968,301	28,739—	1.45—
Dec.	1,968,140	161—	0.01—
Year	.....	...	.....
1933			
Jan.	1,898,644	69,495—	3.50—
Feb.	1,854,200	44,444—	2.30—
March	1,841,002	13,198—	0.70—
April	1,864,574	23,572	1.27+
May	1,929,815	65,241	3.49+
5 Mo.	.....	.....	....

*For public use

Electric Power

Millions Kilowatt Hours

1932	Production*
Jan	7,567
Feb.	7,023
March	7,323
April	6,790
May	6,650
June	6,563
July	6,547
Aug.	6,764
Sept.	6,752
Oct.	7,073
Nov.	6,952
Dec.	7,149
Year	83,153
1933	
Jan.	6,932
Feb.	6,285
March	6,673
April	6,451
May	....
5 Mo.	....

Coke

Net Tons Production

1932	By-Product	Beehive
Jan	2,100,923	37,900
Feb.	1,935,780	35,800
March	2,089,391	37,400
April	1,883,391	55,000
May	1,742,517	45,000
June	1,536,712	41,200
July	1,523,422	38,200
Aug.	1,473,904	40,700
Sept.	1,544,491	45,700
Oct.	1,738,716	67,600
Nov.	1,751,581	81,400
Dec.	1,786,035	95,600
Year	21,166,913	772,500
1933		
Jan.	1,784,527	81,900
Feb.	1,638,817	84,100
March	1,666,035	93,300
April	1,656,183	47,000
May	1,742,517	45,000
5 Mo.	9,812,002	362,100

Steel Barrels

Units

1932	Production	Shipments
Jan	359,685	352,135
Feb.	367,472	369,882
March	452,294	453,621
April	447,379	452,191
May	427,299	425,662
June	651,916	654,561
July	352,614	353,336
Aug.	362,993	360,509
Sept.	395,640	398,241
Oct.	422,637	417,490
Nov.	373,190	376,647
Dec.	300,570	307,372
Year	4,920,117	4,928,307
1933		
Jan.	292,201	292,609
Feb.	269,755	272,432
March	373,340	371,945
April	401,086	402,506
May	465,418	467,695
5 Mo.	1,801,800	1,807,187

River Traffic

Net Tons

1932	Allegheny	Monongahela	Ohio
Jan	.....	25,327	45,199
Feb.	2,200	20,089	40,737
March	550	32,234	33,254
April	501	23,849	32,972
May	2,550	23,941	28,257
June	3,611	18,291	27,305
July	1,400	13,677	22,895
Aug.	3,400	26,390	43,621
Sept.	1,200	18,831	28,557
Oct.	21,280	24,305	40,399
Nov.	23,225	29,851	45,735
Dec.	7,200	23,169	30,048
Year	67,117	284,954	418,990
1933			
Jan.	1,627	11,724	18,002
Feb.	1,656	17,904	23,614
March	425	19,546	32,917
April	3,025	35,795	37,191
May	4,400	39,890	46,038
5 Mo.	11,133	124,869	157,762

WHERE-TO-BUY

Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, ETC.

BULLDOZERS
Logemann Bros. Co., 3126 Burleigh St., Milwaukee.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
American Heat Economy Bureau Inc., Wabash Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

BURNERS (Fuel, Oil, Gas, Combination)
Wean Engineering Co., Warren, O.

BUSHINGS (Bronze)
Shenango-Penn Mold Co., Dover. O.
Shoop Bronze Co., 344-54 W. 6th St., Tarentum, Pa.

BY-PRODUCT PLANTS
Koppers Construction Co., 1301 Koppers Bldg., Pittsburgh, Pa.

CADMIUM
Udylite Process Co., 3939 Bellevue Ave., Detroit, Mich.

CADMIUM PLATING PROCESS
Udylite Process Co., 3939 Bellevue Ave., Detroit, Mich.

CARBIDE
Linde Air Products Co., 30 E. 42nd St., New York City.

CAR DUMPERS
Alliance Machine Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland.
Bethlehem Steel Co., Bethlehem, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTINGS (Acid Resisting)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Driver-Harris Co., Harrison, N. J.
International Nickel Co., Inc., 67 Wall St., New York City.
Shenango-Penn Mold Co., Dover. O.
Shoop Bronze Co., 344-54 W. 6th St., Tarentum, Pa.

CASTINGS (Alloy Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Shenango-Penn Mold Co., Dover. O.
Shoop Bronze Co., 344-54 W. 6th St., Tarentum, Pa.

CASTINGS (Electric Steel)
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Gray Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

CASTINGS (Heat Resisting)
Driver-Harris Co., Harrison, N. J.

CASTINGS (Malleable)
Peoria Malleable Castings Co., Peoria, Ill.

CASTINGS (Steel)
Allegheny Steel Co., Brackenridge, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Worm & Gear Bronze)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.

CEMENT (High Temperature)
Norton Company, Worcester, Mass.
Strong, Carlisle & Hammond Co., The, 1394 W. 3rd St., Cleveland, O.

CHAIN (Sprocket)
Peoria Malleable Castings Co., Peoria, Ill.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CHROME ORE
Samuel Frank, & Co., Inc., Harrison Bldg., Philadelphia.

CHROMIUM METAL
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CLEANING SPECIALTIES
American Chemical Paint Co., Ambler, Pa.

COAL AND COKE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Hanna Furnace Corp., The, Detroit, Mich.
Interlake Iron Corp., Union Trust Bldg., Cleveland, O.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

COAL, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

COKE—See COAL AND COKE

COKE OVEN MACHINERY
Alliance Machine Co., The, Alliance, O.
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland O.

COKE OVENS (By-Product)
Koppers Construction Co. 1301 Koppers Bldg., Pittsburgh.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS
Morgan Construction Co., Worcester, Mass.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., 2098 E. 79th St., Cleveland, O.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CONDUITS (Electric)
Steel & Tubes, Inc., 224 E. 121st St., Cleveland, O.
Youngstown Sheet & Tube Co., Youngstown, O.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROLLERS (Electric)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONVEYER BELTS (High & Low Temperature)
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.

COUPLINGS (Flexible)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CRANES (Charging)
Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Creeper, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

CRANES (Electric)
Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Hand)
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Jib)
Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Locomotive)
Harnischfeger Corp., 411 W. National Ave., Milwaukee, Wis.

CUTTING AND WELDING—See WELDING

CUTTING OILS
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Scaife, Wm. B., & Sons Co., Oakmont, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 120 Broadway, New York City.

DIE BLOCKS
Bethlehem Steel Co., Bethlehem Pa.
Bissett Steel Co., 945 E. 67th St., Cleveland, O.

DIE HEADS
Landis Machine Co., Waynesboro, Pa.

DOLOMITE—Flux and Refractories
Basic Dolomite, Inc., 1510 Hanna Bldg., Cleveland, O.

DOORS AND SHUTTERS (Steel, Fire and Rolling)
Truscon Steel Co., Pressed Steel Div., Youngstown, O.

DRILLING MACHINES (Multiple, Heavy Duty)
Thomas Spacing Machine Co., Pittsburgh, Pa.

DRILLING MACHINES (Radial)
Thomas Spacing Machine Co., Pittsburgh, Pa.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Cut Herringbone Gears)
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Multi V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire, The, Economic Service, Inc., 551 Fifth Ave., New York, N. Y.

ELECTRIC HEATING ELEMENTS
Driver-Harris Co., Harrison, N. J.

ELECTRIC WELDING—See WELDING

ELECTRICAL EQUIPMENT
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O
Morgan Engineering Co., The, Alliance, O.
Wean Engineering Co., Warren, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

ENGINEERS (Consulting)
Perin Engineering Co., Inc., 11 West 42nd St., New York City.
Wean Engineering Co., Warren, O.

ENGINEERS, CONSULTING (By-Product Coke Oven & Gas Plants)
Koppers Construction Co., 1301 Koppers Bldg., Pittsburgh.

FACING MACHINES (Structural)
Thomas Spacing Machine Co., Pittsburgh, Pa.

FANS (Portable)
Perkins, B. F., & Son, Inc., Holyoke, Mass.
International Nickel Co., Inc., 67 Wall St., New York City.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Canton, O.

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Vanadium Corp. of America, 120 Broadway, New York City.